FORESTRY ABSTRACTS

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FORESTRY ABSTRACTS

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THE LAND-USE MOVEMENT IN WEST AFRICA

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THE freedom of the individual is a cherished British ideal, and the extent to which it is denied in the totalitarian countries fills us with abhorrence; but in all human affairs there is virtue in the middle course, and it must be admitted that the British tendency has been to go to the opposite extreme in the extent to which it has allowed freedom to the individual to pursue his own interests without regard to those of the community of which he is a member. This weakness is particularly manifest in the handling of land problems, and there are few parts of the British Empire in which failure to control the use, and prevent the misuse of land in private or communal ownership has not had adverse effects on soil, climate and natural vegetation: on the environment, that is to say, in which human beings have to live.

No serious student of affairs would nowadays defend the economic *laissez faire* of the nineteenth century or minimize the human misery to which it led, and it is to be hoped that future generations will be able to look back on this *laissez faire* of to-day, and the frittering away of natural resources that it entails, as another closed chapter of human unwisdom. In West Africa, however, the immediate signs are not very propitious. Something not far removed from the nineteenth-century *laissez faire* represents the main political ideal of the small section of the population that has developed any conscious political sense, which is strongly individualist and opposed to any restrictions on the exploitation of advantages enjoyed by it over the rest of the population. This political trend is a real danger to future economic reconstruction. No doubt there will be a reaction from it but meanwhile it must be catalogued among the more serious obstacles to the development of a movement towards the more rational use of natural resources.

In the Colonial Empire generally, no claim can as yet be laid to any marked progress towards better control of the use of rural land, though in certain colonies a useful beginning has been made, and the ferment of intelligent thought is at work everywhere. Naturally the movement has suffered a serious setback due to war factors. The rate of its recovery after the war will, I think, depend largely on the example set by Britain herself, and in this respect the decision to set up a Ministry of Town and Rural Planning in the United Kingdom is a hopeful sign. Moreover, in view of President Roosevelt's well-known interest in conservation, the subject is not likely to be lost sight of in international discussions of post-war problems.

The purpose of this paper is rather to discuss the administrative approach to the problem than to argue the need for rural planning, which is sufficiently obvious to any one who has given the question any thought at all. Most of us in West Africa are familiar with cases of ribbon development along new roads; of soil deterioration caused by undue pressure of population in the vicinity of wells constructed in arid regions, and similar untoward consequences of providing new developmental facilities without realization of the need for regulating their use; of uncontrolled planting of rubber on such a scale as to leave insufficient land for the growing of essential food crops; of the destruction of fine forest for cocoa plantations that, owing to unsuitable soil conditions, will be derelict in a few years. Such instances could be multiplied indefinitely, but it will be more profitable to consider what is being, and should be, done to set things right. The views expressed in this article are based primarily on experience in Nigeria but investigation would no doubt reveal the development of thought and action on closely parallel lines in other regions of the Colonial Empire.

The appreciation of the need for rural planning could no doubt be traced back for many years in Nigeria, particularly in the Northern Provinces, where the authority of the Emirs makes it a much more easily realizable objective than in the South; and no one could possibly claim credit for it as a new idea. But it is only in comparatively recent years that practical applications have been considered. The Report of the Anglo-French Forestry Commission of 1936–7, appointed to investigate the question of desiccation along the frontier between Nigeria and Niger Colony, helped to turn thoughts in this direction. It led one of the members of the Commission, Mr. J. R. Patterson, C.M.G., Senior Resident of Kano, to advocate, in a memorandum on 'Administrative Matters arising from the Anglo-French Forestry Commission' dated shortly after the Commission's Report, the appointment of an Administrative Officer of some years standing in each of the frontier provinces to organize what was essentially the control of land use. The officer in question was to 'work in close co-operation with and with the advice of all the technical officers concerned and . . . pay particular attention to the correlation of departmental activities in the region' That, I think, was the first suggestion of the need for a concerted and co-ordinated attack on the problem under administrative leadership, and, while it had no immediate result, it was a highly significant departure.

For it is clear enough to anyone who has studied the subject at first hand that the primary cause of backwardness in this field has been the failure of administrations to recognize and assign responsibility, and to provide machinery, for the control of land use. That most administrative services have never really felt the weight of such responsibility may be be gathered from perusal of the average annual report on administration, in which such subjects as the maintenance of public order, the administration of justice, finance and taxation, health, education, public works, local political and economic questions and so on, occupy the foreground. Town planning may occasionally come into the picture, rural planning very infrequently. I think that there has been a subconscious idea that responsibility for the latter rests, or has been devolved on, the technical departments concerned with rural activities, though obviously none of these departments could individually accept such responsibility in a comprehensive sense. Agricultural Departments as a rule look only to lands under permanent or rotational cultivation, and questions of current production are apt to overshadow those of future development. Veterinary Departments are often too preoccupied with problems of disease and of the development of markets for animal products to pay adequate attention to the management of pasturage, and Forest Departments might well enter the plea that their effective powers of control over land use extend only to forest reserves; though actually in Nigeria the Forest Department may fairly claim to have worked harder than any other Government body for the cause of co-ordinated rural planning.

Some of the younger generation of administrative officers, be it said, are fully alive to the unsatisfactory nature of the present position and live in hope that, after the war, there will be a re-orientation of their efforts in the direction of what may be called the developmental side of administration. They feel that, for all the sterling work that their Service has accomplished in bringing about innumerable social reforms, there has been undue concentration on that aspect to the neglect of economic reforms that are of equal—in some cases even greater—urgency, such as those that are needed to check the wholesale deterioration of the land on which so large a proportion of the population is dependent for its subsistence. But all agree that, in order to effect such economic reforms, the Administration must have regulatory and executive powers at least as stringent as those that have been required to put down social abuses; and that it is impossible to obtain any reasonably rapid change in the traditional usages of the African that constitute misuse of land without some measure of compulsion, in one form or another. The development of the anthropological aspect of this argument could be carried on *ad infinitum* on the theme that the more primitive the people, the more necessary the sanction; and, as they point out, it is no accident that such progress as has been made in Nigeria towards improved land usage has been in the more dictatorial North.

In the same connotation these administrative officers look upon the traditional agricultural policy of Nigeria, as set out in the first part of chapter 8 of Faulkner and Mackie's 'West African Agriculture',* as one of the greatest obstacles to progress, in view of its strong opposition to any form of coercion towards the adoption of improved agricultural methods; and it is indeed obvious that the policy there described was never intended to be part of the framework of large-scale schemes of rural reconstruction. Nor does it appear to recognize the urgent call for remedial action, perhaps because at the time when it was formulated the immensity of the social and economic problems arising from soil degradation in certain parts of Nigeria was not as fully appreciated as it is to-day. An aspect of this policy that is regarded particularly askance is the objection to propaganda through the Administrative Staff and the Native Authorities. This objection has had perforce to go by the board in war-time production drives and it is hoped that the experience gained will bring about a change of outlook. It is also considered significant that, in the movement pioneered by the Provincial Welfare and Development Board of Bornu Province to set up in each province joint propaganda organizations representative of the departments interested in rural welfare[17], the objection has been overborne by the general consensus of opinion.

There is, it is true, some plausibility in the theory that the African farmer should be taught improved methods by example rather than by precept, but in practice it seems to many to be 'fiddling while Africa burns'; while the argument that we must not tell the farmer what to do because, if we should prove to be wrong, he would never trust us again is a little reminiscent of the exaggerated caution of Bernard Shaw's priest, who found it better not to believe in anything because to do so would be sure to get him into trouble with somebody. In brief, the policy is exposed to criticism by reason of the predominance in it of the doctrine of *laissez faire*.

It is understandable that more senior elements in the Administrative Service should be reluctant to see new burdens added to its multifarious responsibilities, and in respect of rural planning there seems to be an overwhelming case for making *ad hoc* provision for the carrying of the burden, as has been done in recent years, for example, with labour problems in the Colonies. As these have gradually become too complex to be dealt with in the ordinary course of administrative routine, specialized departments or organizations have been set up to deal with them. On this analogy, with the realization of the need for rural planning and of the hopelessness of expecting the normal administrative machinery to take this intricate problem in its stride, there should come a splitting off of functions, and the setting up of separate or subsidiary agencies charged with this special responsibility.

The work of rural planning is so closely bound up with other administrative activities that it would be inappropriate to assign it, at all events in its early stages, to a separate department, and it should be dealt with by a special branch of the Administrative Service. The qualifications required would call for careful selection of personnel for this 'planning' branch, and a background of scientific training would probably be found an advantage in men whose duties must consist so largely in organizing team-work by the technical departments. It is likely, indeed, that picked men seconded from these departments would prove a useful addition to the personnel of the branch.

A Conference on Rural Planning, convened at the suggestion of the Forest Department and held at Kano in

* Faulkner, O. T., and Mackie, J. R. West African Agriculture. Cambridge University Press. 1933. pp. 168.

March, 1940, under Mr. Patterson's chairmanship, agreed on the outline of a plan for development on the lines indicated. The gathering included representatives of the Administrative, Agricultural, Forestry, and Veterinary Services and was thus fully representative of the governmental agencies concerned with land use. It envisaged a Provincial Committee meeting at regular intervals, say not less than quarterly, under the chairmanship of the Resident, and forming the main advisory and deliberative body for each Province in matters of land-use. There would also be a technical sub-committee, probably of somewhat elastic composition, which would undertake the executive work of planning, and submit the results of its labours for the approval of the Provincial Committee. This sub-committee would be presided over by the organizing officer of Mr. Patterson's proposal of 1937, who would be in effect a 'Planning Officer' and the Resident's adjutant in dealing with land-use and economic questions generally. Specialist advice on, for example, questions requiring examination by an expert in soil science, would be made available to the sub-committee by the technical departments concerned.

Meanwhile the Nigerian Government, prior to the Kano Conference, had been considering the advisability of setting up Provincial Committees on the lines of the Native Welfare Committee in Nyasaland, that is with a scope embracing the whole complex of native welfare and development, of which land-use planning is only one aspect, albeit a very important one; and was favourably disposed to the idea. This was not in any way inconsistent with the proposals of the Conference and merely implied a possible need for greater flexibility in the matter of sub-committees of the Provincial Committee: for example, a separate land-use planning sub-committee might in practice be found necessary.

Eventually, in September, 1940, Government sanction was given to the formation in the Northern Provinces of 'Provincial Welfare and Development Boards' under the chairmanship of the Resident. These were normally to consist of a representative of the Emir and at least two District Heads (or in pagan areas representatives of Native Authorities), the Senior District Officer in the Province, and the senior provincial representatives of Education, Agricultural, Forestry, Veterinary and Medical Departments. Each Board could have a technical sub-committee, normally under the chairmanship of the Senior District Officer, and otherwise consisting only of technical officers. The chief function of this sub-committee would be to work out in detail matters of policy affecting land, crops and forestry, and to submit them to the Board. It would not formulate policy, and the Board itself would not deal with political matters except after reference to the Chief Commissioner. Another sub-committee might be appointed to deal with the marketing of produce.

The depletion of provincial staffs for military and other war-time duties severely hampered attempts to get the system working, but they were not altogether abortive, and in some provinces valuable work has been done. An endeavour is now being made to extend the scope of the movement, as it is felt by the Government that the machinery of the Boards will be most useful, not only in formulating projects for intensive development in the post-war period but in dealing with questions that will arise as the war draws to its close, especially in connexion with the demobilization of African troops. So far very little has been done in Southern Nigeria: a move was made early in the war period in Owerri Province, where land-use problems are specially acute, but had perforce to be abandoned owing to shortage of personnel.

That is as far as the movement in Nigeria has got, and as a beginning it is not unhopeful. But it is unlikely that rapid progress will be made until a full-time Planning Officer, relieved of all administrative routine, is assigned to each province for the specific duty of organizing the work; though naturally this cannot be considered until establishments return to normal. No one can hope to plan effectively without the collection and collation of all relevant data, and this work alone will keep the Planning Officer very fully occupied. His function of co-ordination of the work of the technical departments, moreover, demands a thorough study of their activities, and this will necessitate frequent touring throughout the Province.

It has been suggested that the duties envisaged for the Planning Officer are really functions of the Resident, but if so they are functions that have not hitherto been effectively performed, presumably because Residents have had insufficient assistance in dealing with such matters. The initiative of an active and not too senior Planning Officer, guided by the mature experience of a Resident, should represent a happy combination of the qualities needed if the considerable leeway in this sphere of administrative activity is to be made up.

The provincial planning organizations may be regarded as the first step in providing administrative machinery for planning, but the need will doubtless soon be felt for some sort of central body to co-ordinate the activities of the Provincial Boards. No question of particular difficulty is likely to arise in the constitution of such a body. It should of course include adequate representation of the Departments concerned with land-use problems, and it should cover the whole field of both rural and urban economics and planning, as these two subjects interlock to so large an extent. The setting up of such a body would provide a mainspring of action controllable by the Central Government, and remove all possible reproach to the effect that the prevailing backwardness was attributable to lack of impetus from above.

In an article published in *Farm and Forest* in 1941 [19], I suggested that in addition to the general machinery for rural planning there should be special machinery for dealing with the problem of 'bad lands', that is to say tracts or regions in which serious soil erosion, or degradation of the soil in other ways, is in progress but could be checked by regulation of those practices on the part of the inhabitants that are responsible for, or contributory to, the deterioration that is taking place; for example, bush firing and shifting cultivation in lands subject to ravine formation. This would call for 'bad lands' legislation, to be applied locally on the advice of an expert Commission composed of members seconded from the technical departments under the leadership of an administrative officer. It is worth noting that my proposals were misunderstood at the time owing to my use of the term Conservation 'Service', on the analogy of the Soil Conservation Service of the United States, to describe my 'Commission'; from which it was inferred that I contemplated the setting up of a new and independent department for the purpose, which was certainly not the intention. I am still of the opinion that an advisory body of the sort described in the article would be a valuable adjunct to the general machinery of land-use control.

That machinery, as indicated earlier in this article, must include legislative and executive powers enabling the provincial planning bodies to give effect to the plans they formulate. The exact nature of requirements in this respect will have to be determined in the light of evolutionary experience of planning technique, but it is fairly obvious that there will have to be some machinery for the formation of 'land reserves' located in unoccupied or sparsely populated areas, in which settlement will be allowed only on conditions ensuring the proper use of the land. There is already a disposition to regard forest reserves in this light, but it is a most unsatisfactory expedient in that the odium of holding up land is concentrated on the Forest Department, and the real purpose of forest reserves as areas dedicated permanently to the production of timber, fuel and other forest produce is obscured. Nevertheless, while the choice of areas for forest reserves in Nigeria has been largely adventitious and determined rather by the varying intensity of local opposition to their creation than by any considerations of land-use planning, many of the forest reserves, particularly in the North, should provide useful sites for future schemes of ordered settlement, in which the land planner will be free to 'classify' without the complications arising from uncontrolled settlement prior to his advent.

The expedient of forming model settlements to which settlers will be attracted from regions in which the population is either over-crowded or unduly dispersed is well exemplified by the Anchau Settlement in Zaria Province of which Nash has written [15] in *Farm and Forest*. In this case the motive is to concentrate the population scattered over an area in which there is a heavy incidence of sleeping sickness infection in a tsetse-free corridor created artificially by clearing vegetation of the type that favours the breeding of the fly. Compulsory powers were needed in the first instance to effect the desired movement of population, but now that the benefits are realized it is becoming more and more voluntary. The compulsory powers were taken, with obvious justification, in the interests of public health, but it would be equally justifiable to resort to them on the more general ground of public welfare even where no specific disease has to be combated. Indeed the motive of public welfare will ordinarily include the motive of public health, as for example where the inhabitants of a congested tract are suffering from malnutrition in consequence of the degradation of the land on which they depend for subsistence. Randell [24] believes such conditions to prevail in the areas of Onitsha Province that are suffering from accelerated erosion.

One point on which there is general agreement is that, at the outset, attempts at rural planning on too ambitious a scale should be avoided. The aim should be to create nuclei, in the form of development or settlement schemes of the right kind in suitable locations, on which, in the process of time, further development will accrete.

Machinery is also badly needed for the control of the deleterious practice of annual bush firing. Restrictive legislation in itself is worse than useless without the means of enforcing it, as experience has already shown. More is to be expected of propaganda, accompanied by practical demonstration of the benefits of controlled burning. Systematic research is needed on the technique of control: for example, it will often be impossible to fire-protect continuously over a period of years because the grass and other vegetation is apt to become so 'tindery' that outbreaks of fire are unavoidable. We know very little, moreover, of the processes whereby natural vegetation exercises a recuperative influence on the soil, though it is obvious that it does so, and fire-preventive measures may need modification in the light of new data on this subject. Briggs's description [3] of the artificial planting of Gamba grass (*Andropogon gayanus* Kunth.) as a means of restoring exhausted farmlands in the Tiv region is the more interesting when considered in conjunction with the fact that the same indigenous grass will, in the course of a year or two, invade and colonize abandoned farmlands if they are protected from annual burning. So far the Tiv people have been too indolent to follow the example set by the Agricultural Department at their experimental station and plant Gamba grass by hand, but if they could be induced merely to fire-protect their exhausted farmlands, the same effect might be secured with less labour, though of course not quite so rapidly. The problem of bush firing needs examination also from the anthropological angle: much of it is done for hunting purposes, some by graziers, and in certain cases it plays a part in religious observances. In view of what has been termed in America the 'healing action' of natural vegetation, its protection from bush burning and other destructive practices is of particular importance in 'bad lands' and areas subject to accelerated erosion.

The significance of forests in land-use planning in West Africa calls for brief remark. The forests of Southern Nigeria have considerable potentialities as a source of timber for both domestic use and export provided that they are developed rationally—a process that has only just begun. But this productive function is quite definitely to be regarded as a secondary one: the primary value of these forests is as a bulwark against the deterioration of environment in the direction of aridity, often called 'desiccation', that is going on almost visibly in so many parts of Africa. Besides maintaining and restoring soil fertility, the forests conserve moisture in various ways and moderate extremes of temperature; and the struggle—too often a losing one—has been to maintain sufficient areas under forest throughout the country to arrest the progress of desiccation, which is by no means confined to the arid regions of the North. Intelligent development of the productive capacity of the forests will help very materially in carrying on the struggle by demonstrating that they have a tangible value apart from their influence on environment, which it is always difficult for native people to understand; and will also provide an answer to the constant complaint that the Government is withholding large areas of land (the forest reserves) from agricultural settlement but putting them to no alternative use. Apart from the problem of bush fires, forest conservation is a much simpler task in Northern Nigeria, partly because the people know what it means to be short of forest produce, and partly because they have a stronger sense of discipline than the peoples of the South.

One marked benefit from the land-use movement that is already apparent is the growth of co-operation among the technical departments concerned with rural development and the gradual breakdown of the 'isolationism' that has so hampered progress in the past. For example, having regard to the influence of forests on environment discussed in the last paragraph, it is now possible in some circumstances to envisage a symbiosis of agriculture and forestry. Thus it may prove feasible to combine the growing of timber and short-lived cocoa on soils too poor

to sustain cocoa as a permanent crop [8, 33], the forest crop continuing to grow when the cocoa has ceased to bear; and experiments have recently been initiated in the growing of shade-loving agricultural crops under cover of the timber crop in the 'kurmis' (islands of high forest in the savanna bush) of the Northern Provinces [9]. Again there may be possibilities in growing timber and *Hevea* rubber together in two-storied forest, treating the latter as a forest rather than a plantation crop and thus ensuring that it exercises an influence on environment comparable to that of the indigenous natural growth that it replaces. The growing of *Hevea* in relatively close stands would mean a delay in its coming into bearing: this would be an objection if it were grown by private enterprise, but governments and native authorities can afford to wait for a return on their investment. The yield from such 'rubber forest' would be graded up by the progressive thinning-out of poor-yielding stems, and it need never become exhausted like a plantation because it could be perpetually renewed by natural regeneration, which, as in Malaya, is profuse wherever seed-bearers are available and light conditions suitable.

Another advantage of the combination of various forms of productive activity implied in land-use planning is that requisite developmental facilities, such as road systems, power plants for processing and so on, can be shared by the different agencies concerned. This is particularly important to forestry in view of the fact that timber is ordinarily a commodity of low value in relation to bulk, so that transport costs figure largely in the cost of its production. For example, there are many tracts of rather poorly stocked forest in Nigeria which it would be unprofitable to exploit if the timber enterprise had to bear the whole cost of opening them up by road construction; but which it would pay to work if a road system serving both agricultural and forestry needs could be jointly provided. Very recently this idea has been elaborated to cover the establishment of 'processing centres' at strategic points. A group of industries, each dealing with the processing or elaboration of some agricultural, forest or other rural product—palm oil refining, rice milling, textile manufacture, sawmilling and other wood-using industries, rubber processing and so on—would be assembled at one place and share industrial facilities, particularly power, water supply and technical personnel, thereby effecting large economies in management. A network of communications, especially roads, would be carried out from the centre into the region adjacent or 'area of supply', providing for both the inward flow of raw material and the transportation of the finished goods to markets, internal and external. The designing of the system of communications would provide a powerful lever for securing better use of land in that preference would be given to communities that were willing to submit themselves to a reasonable measure of land-use control; the rural population is already keenly alive to the benefits of good roads. The suggestion has been made that such a system would be useful when framing schemes for the settlement on the land of demobilized African troops. A preliminary survey for a pioneer scheme of this kind put forward by the writer is in view, and as this progresses the practical applications of the idea will become clearer.

It is most important that there should be some means of fostering public interest in land-use problems, and it was mainly for this purpose that, with the approbation of the Kano Conference, and the practical support of the Nigerian Government, consisting in the purchase of a number of copies for official use, the quarterly periodical *Farm and Forest* was brought into being. The steady increase in the circulation of this journal—now over 450—has shown how widespread is the latent interest in such subjects, and although its primary purpose is to establish mutual interest in each others' doings on the part of workers in different fields of rural activity, as bearing on land-use problems that are common to all, its propaganda value has of late been greatly enhanced owing to the frequency with which articles are reproduced from it for a much wider audience in the Government publicity weekly, *The Nigeria Review*. It is obvious that the more the educated African can be impressed with the importance and value of intelligent use of land, the faster the movement will gain ground. Progress in checking destructive practices is bound to be slow until public opinion is educated to the need for the repression of such practices.

The need for education in land use has been recently stressed from another angle in a striking article [7] by A. Hunt-Cooke in *Farm and Forest* for November, 1942. This develops the idea of the 'Community School', which aims at being a replica in miniature of the community to which it belongs, confronting its pupils with the same problems on a small scale. Thus the Community School in rural areas would devote itself largely to instruction and practical research in the techniques of agriculture, forestry and pastoral science, and in the planned and conservative use of land. The younger generation in Africa is certainly likely to be more receptive of such ideas than the conservative peasantry of to-day, and the author stresses the dangers inherent in the present drain to the towns, and to 'salaried employment', of the more intelligent element of the rural population, 'leaving less and less leaven in the lump'.

A few remarks may be offered on terminology. It appears to me that there are three phases in the application of land-use measures:—(*a*) fact-finding or *survey* as a basis for planning, (*b*) *planning* proper, or the formulation of plans, and (*c*) *management* according to plan. The first stage in phase (*b*) (planning), and the chief function of the land planner, consists in *land classification*, or the assignment of different tracts in a region to the primary sub-divisions of land use: agriculture, forestry, pasturage, mining and so on. Once that has been done, secondary sub-division, e.g. the assigning of land to different forms of agricultural production, passes from the sphere of the land planner into the sphere of the technical department or departments concerned, which are thenceforward responsible, singly or in collaboration, for further planning in detail, and for the proper management of the areas assigned to their supervision. Much of the fact-finding too must inevitably be undertaken by the technical departments, as, for example, surveys of natural vegetation to provide an indication of the uses for which the land is suitable, such as have been carried out by the Forest Department over large areas of Northern Nigeria.

In this connexion it is to be hoped that something is being done towards setting up an air-survey organization for West Africa after the war. Backwardness in topographical and cadastral survey is one of the major obstacles to the rapid development of rural planning, and air surveys would also greatly facilitate the research on questions of land tenure that is so badly needed but has hardly yet begun. No doubt there are technical difficulties in air survey under West African conditions, notably the factor of low visibility during a large part of the year, but there is no reason to regard them as insuperable. Canada is probably the most advanced country in the world in

this field and expert advice from that quarter might well be sought. It seems important that the air-survey organization should be a permanent one and run by Government rather than commercial agency; and the obvious way of constituting it would be by drawing on war-time personnel and equipment when these are no longer required for military purposes.

It is obviously impossible, within the limits of this already lengthy article, to deal with the various applications, actual or proposed, of land-use planning in West Africa in recent times that are deserving of notice, but the bibliography below cites the more important articles that have appeared in *Farm and Forest* since its inception under its original title, *The Nigerian Forester*. The whole movement is of course in its infancy, and land-planning techniques cannot be laid down in advance, but once the objective is clear, and the organization has been provided, they will be evolved; in fact, their evolution has already begun. *Solvitur ambulando* would be a good motto for the land planner in West Africa, whose chief qualification must be flexibility of mind.

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ABSTRACT SECTION

NOTE.—A capital letter in square brackets following the reference denotes the language in which the paper is written. A small letter denotes a summary in another or the same language, e.g. [G.e.]—German, with English summary. English [E.] is only indicated for papers published in journals usually written in foreign languages.

The term "billion" used in papers originating in North America means a thousand million.

0. GENERAL FORESTRY

01. LIBRARY TECHNIQUE. MATHEMATICAL AND STATISTICAL ANALYSIS

01.5. JORGENSEN, W. E. **The use of a technical library.** *Circ. Ore. Engng. Exp. Sta.* No. 6, 1942. pp. 21.

01.7. GRIFFITH, J. R. **Mathematics of alignment chart construction without the use of determinants.** *Bull. Ore. Engng. Exp. Sta.* No. 12, 1939. pp. 39.

01.7 : 02.1. MATHER, K. **Statistical analysis in biology.** Methuen & Co., Ltd., London. 1943. pp. 247. [John Innes Horticultural Institution, London.]

05.3. *Annual Reports*

05.3 : 07.2. **Report of the activities of the International Union of Forest Research Organizations. January 1942–January 1943.** Sven Petrini, Secretary General, Experimentalfältet, Sweden. 1943. pp. 11. [G.E.F.]

05.3 (410) : 21.8 : 13.15. GUNTON, H. C. **Report on the phenological observations in the British Isles from December 1941 to November 1942.** No. 52. *Repr.* from *Quart. J.R. met. Soc.* 69, 1943 (1–32 + plates).

05.3 (54.2). SABHARWAL, L. R. **Annual progress report on forest administration in the Province of Bihar for the year 1940–41.** Supt., Govt. Printing, Bihar. 1942. pp. 52.

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05.3 (71). CANADA. **National Research Council of Canada: Review of activities for the year ended March, 1941.** Ottawa. 1941. pp. 126. *N.R.C.* No. 1021.

05.3 (71.21). SASKATCHEWAN. **Annual report of the Department of Natural Resources of the Province of Saskatchewan for the fiscal year ended April 30, 1941.** King's Printer, Regina. 1942. pp. 120.

05.3 (71.4). QUEBEC. **Report of the Minister of Lands and Forests of the Province of Quebec for the year ending March 31st, 1941.** King's Printer, Quebec. 1942. pp. 120.

05.3 (728.2). BRITISH HONDURAS. **Abridged report of the Forest Department for the year ended 31st December, 1941.** Govt. Printer, British Honduras. 1942. pp. 4 + tbls.

05.3 (729.7). TRINIDAD and TOBAGO. **Administration report of the Conservator of Forests for the year 1941.** *Council Paper* No. 25 of 1942. Govt. Printer, Trinidad and Tobago. 1942. pp. 4.

05.3 (73) : 45.3 : 44.3. UNITED STATES. **Report of the Chief of the Bureau of Entomology and Plant Quarantine, 1941.** Superintendent of Documents, Washington, D.C., 1942. pp. 120. I.I.E.

05.3 (74.2). NEW HAMPSHIRE. **Agricultural research in New Hampshire: Annual report of the Director of the New Hampshire Agricultural Experiment Station for 1940.** *Bull. N.H. agric. Exp. Sta.* No. 330, 1941. pp. 42.

05.3 (74.3). VERMONT. **Agricultural Experiment Station. Fifty-fourth annual report, 1940–1941.** *Bull. Vt. agric. Exp. Sta.* No. 475, 1941. pp. 40.

05.3 (74.6). CONNECTICUT. **Agricultural Experiment Station. Annual report for the year ending October 31, 1940.** *Bull. Conn. agric. Exp. Sta.* No. 446, 1941 (392–445).

05.3 (75.1). DELAWARE. **Annual report of the State Forester to the State Forestry Commission for the fiscal year (July 1, 1941 to June 30, 1942).** State Forestry Department, Dover, Delaware. 1942. pp. 30.

05.3 (931). NEW ZEALAND. **Sixteenth annual report of the Department of Scientific and Industrial Research.** Govt. Printer, Wellington. 1942. pp. 34.

05.3 (94). AUSTRALIA. **Council for Scientific and Industrial Research. Division of Forest Products. Annual report, 1941–42.** [Melbourne, 1942?] pp. 15.

05.3 (942). SOUTH AUSTRALIA. **Woods and Forests Department. Annual report for the year ended 30th June, 1941.** Govt. Printer, Adelaide. 1942. pp. 12.

05.3 (944). NEW SOUTH WALES. **Report of the Forestry Commission for year ended 30th June, 1941.** Govt. Printer, Sydney. 1942. pp. 12.

07. EDUCATION AND RESEARCH. INSTRUMENTS AND TOOLS

07.1 : 60.31.2 (42.1–8). GREEN, F. J. **The training of foresters for post-war afforestation on private estates.** *Quart. J. For.* 37, 1943 (38–43).

Tentative suggestions are made for the training of the various grades of foresters that would be required in Britain after the war to administrate private woodland estates of different sizes, and of district forest officers.

07.2 (78.6) : 2 : 12.25 : 23.23.3 : 3 : 43 : 61.3. GISBORNE, H. T. **Results and trends at the Northern Rocky Mountain Forest and Range Experiment Station.** *Northw. Sci.* 16, 1942 (68–75). A.P.B.

This conference paper presents a general discussion of the main lines of study and of some of the results so far accomplished in the fields of silviculture, forest products and utilization, range management, fire control and research, and forest survey. Work on silviculture has been largely confined to the one most valuable species of the region—Western White Pine (*Pinus*

monticola)—and the results of all phases of the work on this species have been summarized and published elsewhere. Recent experiments have demonstrated that the artificial regeneration of certain species, including White Pine, Ponderosa Pine, Douglas Fir, Spruce and Cedar, can be successfully accomplished on some sites by direct sowing.

Forest products and utilization research has followed three main lines:—(*a*) timber harvesting and conversion studies; (*b*) wood preservation investigations; and (*c*) forest statistics. The objectives of each of these lines of study are outlined. Contributions to fire research and control have been concerned mainly with (*a*) measurement of fire danger on a numerical scale, and (*b*) systematic planning of fire-control facilities and man-power according to fuel types, occurrence rate, values at stake, and currently measured fire danger.

07.2 (78.9 : 79.1) : 60.3 : 12.25. PEARSON, G. A. **The Fort Valley forest experiment station.** Forest Service, U.S. Department of Agriculture. 1942. pp. 25 + plates. [Southwestern Forest & Range Exp. Sta.]

The Fort Valley Forest Experiment Station is a branch of the Southwestern Forest and Range Experiment Station and its headquarters are at Fort Valley, near Flagstaff, Arizona. Its purpose is to solve problems arising in the management of the forests of the southwestern United States. The most important tree, commercially, in this region is the Ponderosa Pine (*Pinus ponderosa*). An illustrated account of the work of this Station is given under the following heads:—(1) ecology of the forest types; (2) growth, reproduction and mortality; (3) artificial reforestation; (4) stand improvement; (5) control of damage; (6) sale and logging of timber; (7) management of the woodland forests.

07.7 : 32.2 : 33.1. Reinigungsmittel für Holzbearbeitungswerkzeuge. **[Cleaning agents for wood-working tools.]** *Holztechnik* 22, 1942 (213–4). [G.]

Notes on some German substitute cleansers such as 'Benzanul' and on rust preventatives such as vaseline and lanolin.

09.1. *Forest History*

09.1 (43.1–5) : 60.3 : 22.13 : 22.83.2. HEBER, K. 15 Jahre naturgemässe Waldwirtschaft in Bärenfels. I. Geschichtliche Entwicklung des Reviers bis 1926. II. Die Entwicklung des Reviers seit 1926. III. Die Betriebsregelung 1941. **[Fifteen years of natural forestry in Bärenfels. I. Historical development of the forest district up to 1926. II. Development of the forest district since 1926. III. Forest management, 1941.** *Allg. Forst- u. Jagdztg.* 118, 1942 (233–7, 261–8, 283–95). [G.]

Satisfactory results are reported from group-selection management and the abandonment of clear-cutting. The management aims at establishing uneven-aged mixed woods containing different coniferous and broad-leaved species. At present the forest consists mainly of Spruce.

09.2. *Pre-history*

09.2 (77.1–4) : 12.19.4 : 11.21 : 11.11.4. SEARS, P. B. **Forest sequences in the north central States.** *Bot. Gaz.* 103, 1941–42 (751–61). [Oberlin College, Ohio.] O.B.D.

An examination of fifteen pollen profiles from bogs in the States of Illinois, Indiana, Michigan and Ohio indicates that twice in post-glacial times there has been a retrogression in forest composition in the north Central States. First there was a retrogression from Fir through Spruce to Pine. This was followed by a relative increase in Beech, which in turn gave way to Oak and Hickory. Three of the profiles also showed a subsequent appearance of Beech followed by a third retrogression, but this does not seem to have been general. The two periods of more general retrogression appear to have been due to drought conditions in post-glacial times.

09.4. *Forest Statistics*

09.4 (4) : 33.32. Die Holzfaserplattenindustrie Europas. **[The wood fibre board industry of Europe.]** *Holz* 5, 1942 (32). [G.] P.R.

Of European countries, Sweden has the highest production. Its ten enterprises have an annual capacity of approximately 160,000 metric tons. Finland has only one major enterprise, whose production in 1941 amounted to 7 million sq. m. (about 26,000 tons). Norway has three factories with an aggregate annual capacity of about 12,000 tons, which it is proposed to increase to 19,000 tons. The Union Allumettière in Belgium has an annual capacity of approximately 7,500 tons; the Société Isorel in France intends to expand its annual capacity to approximately 17,000 tons. Two Swiss enterprises produce a total of about 4,000 tons per annum. Italy has three enterprises with an aggregate annual capacity of about 21,000 tons. The German industry, comprising 27 enterprises, is expected to produce in 1942 130,000 tons, including 100,000 tons of hard fibre boards. Making allowance for the small enterprises existing in south-eastern Europe, the total 1942 capacity of the industry in continental Europe may be estimated at 400,000 tons, and its demand in wood at 1·6 million cu. m.

09.4 (485) : 33.32 : 98.2. Schwedens Zellstoffindustrie. **[Sweden's cellulose industry.]** *Holz* 5, 1942 (321). [G.]

The total annual capacity of the industry is 3 million metric tons, including 1,780,000 tons sulphite cellulose and 1,220,000 tons sulphate cellulose. Production in 1939 and 1940 was as follows:—

	1939	1940
Wood pulp	689,540	288,736
Sulphite cellulose—		
Bleached	463,736	326,415
Unbleached	1,016,074	535,640
Sulphate cellulose—		
Bleached	127,062	78,727
Unbleached	839,735	680,171
Fodder cellulose	—	57,039
	3,136,147	1,966,728

Recently the position has improved slightly through increased production of fodder cellulose, of which 500,000 tons are to be produced in 1942.

09.4 (73) : 33.15 : 98.1. SOWDER, A. M., and MARQUIS, R. W. **Timber requirements for veneer and plywood: a progress report of the forest survey.** U.S. Forest Service, Department of Agriculture, Washington, D.C. 1941. pp. 49.

Statistics of the U.S. veneer and plywood industry and of the consumption of veneer and plywood in (1) the making of containers, (2) the manufacture of other factory products, and (3) construction. 'Exports have declined in recent years, but are likely to increase considerably after the war. Domestic consumption is rapidly expanding, and timber requirements of the industry by 1950 are estimated at between 1,800 and 3,850 million bd. ft.

09.4 (73) : 33.32. UNITED STATES. **Census of forest products: 1940. Paper and paperboard mills: paper and paperboard production and paper-making machines in use. Pulp mills: wood-pulp production and pulpwood consumption.** Bureau of the Census, U.S. Department of Commerce. 1941. pp. 15.

09.4 (73 : 71) : 33.32. UNITED STATES. **Wood pulp statistics.** United States Pulp Producers Association, 122 East 42nd Street, New York, N.Y. 1942. pp. vi + 95.

Official data on the production, consumption, imports, and exports of wood pulp of the U.S.A. and Canada in recent years, and related information.

09.4 (73) : 33.37 : 33.38 : 34.26. UNITED STATES. **Manufactures 1939. Industries: hardwood distillation and charcoal manufacture, wood naval stores, gum naval stores, fertilizers.** Bureau of the Census, U.S. Department of Commerce. 1941. pp. vi + 14.

09.4 (73) : 33.4. UNITED STATES. **Census of forest products, 1940. Lumber, lath, and shingles.** Bureau of the Census, U.S. Department of Commerce. 1942. pp. 18.

09.4 (73) : 33.4 : 98.1. REYNOLDS, R. V., and PIERSON, A. H. **Lumber distribution and consumption, 1940.** U.S. Forest Service, Department of Agriculture, Washington, D.C. 1942. pp. 19.

09.4 (73) : 33.4 : 98.1. REYNOLDS, R. V., and PIERSON, A. H. **Domestic lumber distribution and consumption, 1941.** U.S. Forest Service, Department of Agriculture, Washington, D.C. 1942. pp. 18.

09.4 (73) : 33.7. REYNOLDS, R. V., and PIERSON, A. H. **Fuel wood used in the United States 1630–1930.** *Circ. U.S. Dep. Agric.* No. 641, 1942. pp. 20. [U.S. Forest Service.]

09.4 (73) : 98.3. STEER, H. B. **Stumpage and log prices for the calendar year 1940.** *Statist. Bull. U.S. Dep. Agric.* No. 76, 1942. pp. 67. [Division of Forest Economics, U.S. Forest Service.]

09.4 (74) : 33.4 : 98.1. JENSEN, V. S., and DESMOND, R. C. **Northeastern lumber production in 1941.** *Tech. Note Ntheast. For. Exp. Sta.* No. 53, 1942. p. 1.

Preliminary figures are given for hardwood and softwood production based on a census of the lumber industry in the New England States and New York.

09.4 (74.8–9 : 75.1–2) : 33.4 : 98.1. WESTVELD, M. **Middle Atlantic states produced half billion feet of lumber in 1941.** *Tech. Note Allegh. For. Exp. Sta.* No. 35, 1942. p. [1].

09.4 (76.1) : 98.1. HUTCHISON, S. B. **Alabama: number one lumber state of the south.** *Sth. Lumberm.* 165 (2081), 1942 (235–7). [Southern Forest Exp. Sta.]

A brief account is given of the trends in timber production in the Southern (Gulf) States. At present Alabama shows the highest annual cut of lumber. The following table compares present growth and present cut of all timber products in the six States.

State	*Billion of bd. ft.*	
	Net forest growth	*Cut of all products*
	1938	1941
Alabama	2·1	3·1
Florida	0·7	1·2
Georgia	2·6	2·6
Louisiana	2·0	2·0
Mississippi	2·1	2·9
Texas	1·9	1·8

09.7. *Monographs of Individual Forest Regions*

09.7 (43.1–5). MITSCHERLICH. Die Hohe Heide im Forstamt Peisterwitz. **[The Hohe Heide forest in the district of Peisterwitz.]** *Z. Forst- u. Jagdw.* 74, 1942 (272–304). [G.g.] [Preussische Versuchsanstalt für Waldwirtschaft, Eberswalde.]

09.7 (44) : 12.25 : 24 : 31.0 : 33.32 : 34.26. LEES, P. M. Los pinares del sudoeste de Francia. **[The Pine forests of southwest France.]** *Univ. Repub.* [*Montevideo*] *Rev. Fac. Agron.* 23, 1941 (21–49). Biol. Abs. 16 (18958).

The author describes the improvement achieved by afforestation in the Landes region. He describes *Pinus pinaster* (*P. maritima*), the predominant species in the region, details of its cultivation and exploitation, the utilization of its wood, the use of the wood for paper pulp, and the utilization of turpentine and rosin.

09.7 (44) : 12.26–8 : 12.25. MEYER, P. Quelques observations sur les conditions forestières du Bas-Languedoc. **[Some observations on forestry conditions in Bas-Languedoc.]** *J. for. suisse* 93, 1942 (225–30). [F.]

Notes on the Holm Oak and Aleppo Pine woods in the surroundings of Montpellier.

09.7 (75.5 : 76.8–9) : 12.19.2 : 22.88.1. BRAUN, E. L. **Forests of the Cumberland Mountains.** *Ecol. Monogr.* 12, 1942 (413–47). [University of Cincinnati.]

The study described covered approximately 5,000 sq. miles of forest area in southeastern Kentucky and adjacent regions in Virginia and Tennessee. Originally most of the area was covered with high quality mixed deciduous forests, now much depleted by logging and represented by rapidly diminishing areas of virgin forest and extensive cut-over and secondary stands. The mixed mesophytic forest prevails over most of the area and under this association the mull type of humus layer has developed. Forest composition was found to vary with slope exposure and to some extent with altitude, and local departures from the mixed mesophytic forest are due to extreme edaphic factors. In number of tree species, in size of individuals and in variety of forest types, the area compares favourably with any in North America.

1. FUNDAMENTAL NATURAL LAWS OF THE FOREST

11.3. *Situation*

11.34. Configuration of Ground. Topography

11.34 (79.4) : 11.41.5–6 : 97.1. STORIE, R. E. **Natural land divisions of Santa Cruz County, California: their utilization and adaptation.** *Bull. Calif. agric. Exp. Sta.* No. 638, 1940. pp. 56.

The natural land divisions are based on uniformity of natural physical characteristics such as topography, soils, drainage, erosion and climate. The main physiographic groups are:—A. smooth valley land, B. basin land, C. lower terrace land, D. high terrace land, and E. upland. These groups are subdivided on the basis of soil texture and composition. The timber, woodland or brush land, totalling 168,478 acres or 60·5 per cent. of the county, is confined to section E. The type of land classification here exemplified is expected to be of practical value in land utilization.

11.4. *Soil*

11.43. Biology of Soil, including Mycorrhiza

11.43.1 : 11.48.2 : 23.23 : 12.25. ROSENDAHL, R. O., and WILDE, S. A. **Occurrence of ectotrophic mycorrhizal fungi in soils of cut-over areas and sand dunes.** *Abstr.* in *Bull. ecol. Soc. Amer.* 23, 1942 (73). [University of Wisconsin, Madison, Wis.] I.F.B.

The lack of mycorrhizal fungi in soils of old cut-over areas and sand dunes was believed to be partially responsible for frequent failures of reforestation by means of direct seeding. To verify this assumption, a study was carried on in the sandy area of central Wisconsin. Numerous directly-seeded plots, protected by wire screens, were established on abandoned fields, blow-outs, forested areas and prairie soils. Soil samples were also taken from these sites and seeded to Pine species in the greenhouse. Jack Pine, Red Pine and White Pine were used as indicators of the presence of mycorrhizal fungi.

Results of the study demonstrated that fungi capable of forming mycorrhizae on conifers are present in varying amounts in the soils of cut-over areas, including wind-blown sands with a denuded humus layer and fields which have been under cultivation or grazing for a period as long as sixty years. Some of these soils were located as far as two miles from the boundary of the present forest. Complete absence of mycorrhizal fungi was invariably recorded in the neighbouring areas of prairie soils of similar sandy texture. Extensive failure of seedlings in field trials was caused by periodic droughts and by damping-off fungi.

11.43.1 : 12.25 : 12.21. MODESS, O. Zur Kenntnis der Mykorrhizabildner von Kiefer und Fichte. [**On the development of mycorrhiza in Pine and Spruce.**] *Symb. bot. upsaliens* 5 (1), 1941 (3–147 + plates). Biol. Abs. 16 (18795).

Pure cultures of 55 species of Hymeno- and Gastromycetes were used in attempts to synthesize mycorrhizae with conifers. *Pinus sylvestris* formed mycorrhizae with *Amanita mappa*, *A. muscaria*, *A. pantherina*, *Boletus flavidus*, *Entoloma rhodopolium*, *Lactarius helvus*, *Paxillus prunulus*, *Tricholoma albobrunneum*, *T. imbricatum*, *T. pessundatum*, *T. vaccinum*, *Rhizopogon luteolus*, *R. roseolus* and *Scleroderma aurantium*. *P. montana* formed mycorrhizae with *Amanita mappa*, *A. muscaria*, *A. pantherina*, *A. rubescens*, *Boletus flavidus*, *B. subto mentosus*, *Lactarius helvus*, *L. rufus*, *Tricholoma albo brunneum*, *T. imbricatum*, *T. pessundatum*, *Rhizopogo roseolus*, and *Scleroderma aurantium*. *Picea abie* formed mycorrhizae with *Amanita mappa*, *A. muscaric A. pantherina*, *Boletus flavidus*, *Lactarius helvu Tricholoma albobrunneum*, *T. imbricatum*, *T. pessunda tum*, and *Scleroderma aurantium*. Studies of the pH requirements of the fungi under cultural conditions an in the field showed variations in requirements amon the species.

11.43.1 : 56 : 12.25. HERSHEY, J. W. **The influenza o mycorrhiza on growth of Korean Nut Pine.** *For. Leave* 32 (4 & 5), 1942 (19).

Poorly growing trees of *Pinus koriensis* showe marked improvement after the application of soil fron the site of a thriving tree of the same species. Examina tion of the roots of a particularly fine tree showed heavy infection of mycorrhiza.

11.43.2 : 13.2 : 11.44. EATON, T. H., and CHANDLER R. F. **The fauna of forest-humus layers in New York** *Mem. Cornell agric. Exp. Sta.* No. 247, 1942. pp. 26.

A study of 16 sites in New York representing 6 type of forest humus layers. The soil fauna consisted largel of arthropods and two species of annelid worms (*Allo lobophora caliginosa* and *Lumbricus terrestris*). Th earthworms were active particularly in coarse mull of th A_1 horizon, but were, as a rule, absent in mor humu layers and in fine mull where the arthropod populatio was high, being between 1,200 and 8,500 in a sq. f section 1 in. thick. Both types of soil fauna are o prime importance in the disintegration of leaf litter int humus material and for much of its mechanical overtur afterwards.

11.44. Surface Humus

11.44 : 11.42.1 : 11.43.1 : 12.14.5. MARTEN, E. A., an POHLMAN, G. G. **Forest soil studies. II. Changes i microflora and chemical composition of decomposing tre leaves.** *Soil Sci.* 54, 1942 (67–77). [West Virgini Agricultural Exp. Sta.] O.R.E.

Ground leaf samples from *Pinus pungens*, *Fagu grandiflora*, *Acer rubrum*, *Liriodendron tulipifera*, *Quer cus rubra* and *Juglans nigra* were inoculated with a so suspension from a mixed stand, incubated for 32 weeks and changes in flora and chemical composition wer noted. Results indicated that the type of forest humu developed may depend on the rate as well as on the typ of decomposition. Leaves with a low content of exces base and a high lignin content decompose slowly an tend to produce a mor type of organic layer. Earl decomposition affected mainly the water-solubl materials, decomposition of cellulose and lignin takin place in the later stages. In all but the Red Maple th rate of cellulose decomposition was about twice as grea as that of lignin. The types of micro-organism present were the same regardless of the kind of lea samples used.

11.47. Maintenance of Favourable Soil Conditions

11.47.2 : 11.44 : 11.47.13 : 56 : 12.25. WITTICH, W Die Aktivierung von Rohhumus extrem ungünstige Beschaffenheit. (Untersuchungen in den Reviere

Adorf und Ebnath.) **[The activation of raw humus of extremely unfavourable quality. (Investigations in the forest districts of Adorf and Ebnath).]** *Z. Forst- u. Jadgw.* 74, 1942 (241–71). [G.]

Improved growth of young conifer plantations was obtained following treatments which involved liming, mixing the raw humus with the subsoil, and (in parts) the cultivation of perennial lupine and broom between the rows.

11.47.21 : 24.31. Klorat som markförbattere. Lovande försök i skogsmark. **[Chlorate as a soil improver. Promising experiments in woodland.]** *Svenska Vall- och Mosskulturföreningens Kvartalsskrift* 4, 1942 (81–3). [Sw.] A.P.B.

In a preliminary communication entitled 'Klorat i skogsbrukets tjänst' (Chlorate in the service of forestry) by G. Kolmodin, published in Part 1, 1942 of *Norrlands Skogsvårdsförenings Tidskrift*, experiments are described in which sodium chlorate was used to destroy scrub vegetation. In the first experiment, begun in October 1936, a solution containing 4 per cent. by weight of sodium chlorate was applied at the rate of 1–3 l. per sq. m. to kill bilberry shrubs. The ground cover, consisting mostly of bilberry, was largely destroyed while the forest stand was found to have been favourably influenced by the chlorate treatment. In 1937 the chlorate was applied to the ground cover in the form of powder, partly in June and partly in the late autumn. It was found that autumn spreading had a more toxic effect than spreading in summer, and also that grasses and herbs, Birch and Mountain Ash were but slightly susceptible to the salt, at least with autumn spreading. The amounts used varied between 20 and 300 l. of the salt per ha. To eradicate heather even a smaller quantity than 20 l. per ha. was sufficient.

From review by B. W.

11.6: *Hydrographical Conditions. Water and Soil Conservation*

11.6 : 11.1 : 07.7. **Hydrologic data, North Appalachian Experimental Watershed, Coshocton, Ohio, 1939.** *Hydrol. Bull. U.S. Dep. Agric.* No. 1, 1941. pp. 193 + plates.

11.6 : 11.14.4 : 65.7. Niederhof, C. H., and Dunford, E. G. **The effect of openings in a young Lodgepole Pine forest on the storage and melting of snow.** *J. For.* 40, 1942 (802–4). [Rocky Mt. Forest & Range Exp. Sta.]

A study made in two young Lodgepole Pine (*Pinus contorta*) stands in the Fraser Experimental Forest, Colorado, at an elevation of 9,000 ft., showed conclusively that snow storage and rate of melting are influenced by the size of crown openings. In the stands examined, which had average tree heights of 17 and 23 ft. with openings between trees of an average diameter of 19 and 21 ft., respectively, it was found that the largest volumes of water in stored snow at the beginning of the melting season were in openings with a diameter of 20 ft. or more, whereas optimum conditions for prolonging the period of snow melt as well as for maximum winter accumulation—i.e. optimum storage conditions—were under crown openings between 16 and 17 ft. in size.

11.6 : 91.3. Dubakh, A. D. **Increasing the flow of water into rivers of the Caspian Basin by forestry measures.** *Lesnoe Khozyaystvo, Moscow* 1940 (8), (32–5). [R.] [Leningrad Forest Academy.]

It has been estimated that the level of the Caspian Sea may be lowered by as much as 2·5 metres as a result of the proposed construction of major reservoirs along the Volga and its tributaries and of the use of Volga water in irrigating fields in the Trans-Volga Region. Such a lowering of the sea level would cause difficulties to shipping in the Volga delta and along the shore of Iran and would alter considerably the conditions of fishing in the Caspian and of the exploitation of mineral salts in the Qara-Boghaz. It is argued that this tendency could be counteracted to an appreciable extent by measures that would increase transpiration and evaporation from forests in the basins of the Northern Dwina, the Onega, the Mezen, the Pechora, the Neva, and the upper part of the Dnieper. The moisture released would be carried by the prevailing winds towards the south and the east, thus increasing rainfall in the territories from which the Volga gets its water. At present the forests of the north and the west of European Russia do not vaporize moisture sufficiently, so that over one-half of the rainfall water coming from the ocean flows back to it almost immediately. Measures advocated include (1) felling of overmature forests and their replacement by young stands which grow fast and vaporize large volumes of water; (2) thinning of dense stands, as there is a *prima facie* reason to believe that vaporization will increase if air can move more freely through the stand; (3) removal of slash to facilitate evaporation from the soil; (4) forestation of blanks; and (5) forest drainage, which would result in improved growth and hence increased transpiration.

11.62.1 : 23.3 : 23.21 : 12.25. Arnst, A. **Vegetal stabilization of Oregon coastal dune areas.** *Northw. Sci.* 16, 1942 (59–67). A.P.B.

Account of a project for stabilizing and reclaiming an area of 3,000 acres of shifting sands on the Clatsop Plains, Oregon. Although afforestation is the most effective means of permanent reclamation, the planting of pioneer grasses and herbs is essential before trees or shrubs can be established. Usually woody or herbaceous legumes form a desirable intermediary stage, Scotch Broom (*Cytisus scoparius* (L.) Link) having been found most successful. Of the Pine species tried, Scots Pine (*Pinus sylvestris* L.) and Cluster Pine (*Pinus pinaster* Ait.) proved good, but not superior to *Pinus contorta* Loudon, the native Shore Pine, which showed itself most adaptable to the local conditions.

11.62.21 : 11.49.5 : 38.62 : 56. Lebarron, R. K., and Neetzel, J. R. **Drainage of forested swamps.** *Ecology* 23, 1942 (457–65). [Lake States Forest Exp. Sta.]

Drainage of a forest bog by means of two parallel ditches 300 ft. apart (2½ and 3 ft. deep, respectively), resulted in accelerated growth of Arborvitae trees located between the ditches, but the effect of drainage on tree growth did not extend more than 100 ft. north of the ditch bordering on an upland area which drained into the swamp. The change in environment also led to the dominance of new species, notably Red Maple and Alder, a stage ecologically more advanced but of lower commercial value.

11.62.3 (43.9) : 96.5. Stubnya, D. A magyarországi árvizek keletkézéseröl. **[Causes of Hungarian floods.]**

Erdész. Lap. 80 (10), 1941 (563–71). [Hung.g.f.e.] Biol. Abs. 16 (23047).

Forests on the headwaters of rivers draining into the central Hungarian plain were devastated during the period of foreign control after 1919. Reforestation and engineering control of mountain torrents are the only methods of preventing floods that promise success.

12.1. *General Botany*

12.11. Physiology. Reproduction. Growth

12.11.1. *Metabolism. Plant Constituents. Sap Flow*

12.11.1 : 12.14.7 : 23.23.15. AFANASIEV, M., and CRESS, M. **Changes within the seeds of *Juniperus scopulorum* during the processes of after-ripening and germination.** *J. For.* 40, 1942 (798–801). [Oklahoma Agricultural & Mechanical College.]

Records the changes observed in the seed of *J. scopulorum* during stratification at low temperature, and in after-ripened seed just before and during germination. From work done it is suggested that the catalase activity can be used as a measure of the rate of after-ripening of the seeds of this species.

12.11.1 : 12.26–8 : 11.41.3. DAUBENMIRE, R. F., and CHARTER, H. E. **Behavior of woody desert legumes at the wilting percentage of the soil.** *Bot. Gaz.* 103, 1941–42 (762–70). [University of Idaho.] O.B.D.

Two series of experiments to determine the significance of the wilting percentage of the soil to three species of woody desert legumes, *Prosopis velutina* Woot., *Acacia farnesiana* Willd. and *Lysiloma thornberi* Britt. and Rose. The first series of experiments aimed at discovering the visible changes which take place in the legumes on their reaching the point at which mesophytes such as wheat permanently wilt. The second series was concerned with the effect of this soil-moisture condition upon the rate of transpiration. With the attainment of the wilting point the legumes showed a marked increase in the rate of abscission, a deviation from the normal diurnal position of the pinnules, a cessation of the terminal growth of the shoot, and a sudden decrease in the rate of transpiration.

12.11.1 : 2. SNOW, A. G. **Voltage gradient measurements in forest trees.** *J. For.* 40, 1942 (872–6). [Northeastern Forest Exp. Sta.]

It is shown that the internal physiological changes taking place in a cutting that is gradually being killed by the introduction of toxic substance in the transpiration stream are reflected in a change in potential difference soon (within 5 minutes) after the introduction of the toxic substance and long before any external change is apparent in the cuttings. It is pointed out that voltage gradients in plants are closely associated with the growth processes, and the suggestion is made that voltage gradient determinations have many possible uses in connexion with silvicultural investigations.

12.11.11 : 12.14.7 : 12.26–8. HILDITCH, T. P., and ZAKY, Y. A. H. **The fatty acids and glycerides of solid seed fats. XI. *Shorea robusta* kernel fat.** *J. Soc. chem. Ind., Lond.* 61, 1942 (34–6). [University of Liverpool.] L.S.

Shorea robusta produces nuts containing 72 per cent. of kernels, which yield only about 14 per cent. of a pale green coloured fat, m.p. 34–36°. The fat differs from Borneo tallow both in its low proportion in the kernel and in its component acids. The component glycerid of the kernel fat are listed. *From authors' summary.*

12.11.11 : 12.14.7 : 12.26–8. LAHIRI, J. K., and GHOS S. **Chemical examination of the seeds of *Barrington acutangula* Gaertn.** *J. Amer. pharm. Ass. (Sci. Ed.)* 3 1942 (193–4). [School of Tropical Medicine, Calcutta P.S.G.B.

The toxic principle of the seeds of *Barrington acutangula* is an amorphous acid saponin. Oth substances such as starch, fatty oil and sugars a present. The poisonous action of the seeds on fi could be accounted for by the presence of the saponi *Authors' summary.*

12.11.11 : 31.3. Giftige und für die Gesundhe nachteilige Holzarten. **[Poisonous tree species and tho having a negative effect on health.]** *Hout* 20, 1940 (18 [Du.] *Abstr.* in *Holz* 5, 1942 (285). [G.] P.R.

A great number of tree species, mainly exot possess characters which can cause disease in huma beings. Some very dangerous diseases can result fro touching the wood, especially in the presence moisture. However, a certain immunity can gradual be acquired. The poisonous effects of the Europe trees Yew, Poplar, and Laburnum are well know Of overseas species, the most important ones in th respect are *Leeythis costaricensis*, *Rhus toxicodendr Gluta rengas*, *Erythroploeum guinaese*, *Notandra rodio Pterocarpus indicus*, and *Chlorophora excelsa.*

12.11.15 : 12.11.22. HITCHCOCK, A. E., and ZIMME MAN, P. W. **Root-inducing activity of phenoxy co pounds in relation to their structure.** *Contr. Boy Thompson Inst.* 12, 1942 (497–507).

12.11.15 : 12.11.22 : 23.23.15 : 23.26. SWARTLEY, J. C and CHADWICK, L. C. **Effects of synthetic grow substances on cuttings, seeds, and transplants.** *Bi- Bull. Ohio agric. Exp. Sta.* 27, 1942 (125–44).

The application of synthetic growth substances leafy cuttings of woody plants was definitely benefici in 8 out of the 17 species tested, but no marked effec were observed from the treatment of seeds. The ul mate practical value of the treatment of transplants doubtful.

12.11.15 : 12.11.23 : 12.25. BENSEND, D. W. **Effect thiamin and niacin on growth of Jack-Pine seedlings.** *For.* 40, 1942 (883–4). [University of Minnesota.]

The application of 0·10 mg. of thiamin (vitamin B per litre of standard cultural solution to Jack Pi seedlings at three different frequencies of once a wee once every two weeks and once every four weeks, a also the application of 0·10 mg. of thiamin and 0· mg. of niacin (nicotinic acid) per litre of solution on every two weeks had no effect on the root or ste growth of the seedlings. Analysis of samples of seedlin receiving thiamin and of those growing under simil conditions but not receiving this vitamin indicated th as long as Jack Pine is given the proper raw materi it can synthesize sufficient thiamin for its own use.

12.11.15 : 12.21. BOSE, S. R., and SARKAR, S. **Enzymes of some wood-rotting Polypores.** *Repr.* fro *Kirtikar Memorial Volume* 1, 1942. pp. 18. [Carmicha Medical College, Calcutta.]

A detailed study of the more important enzymes o species of wood-destroying polypores (*Polypor ostreiformis*, *P. zonalis*, *Polystictus hirsutus*, *P. sa guineus*, *P. leoninus*, *Trametes cingulata*, *T. lactinea* a

Daedalea flavida) in a culture of 2 per cent. malt extract with pH 6·8. The intracellular and extracellular enzymic activity was measured at three different stages in the growth of the fungus:—(1) young vegetative stage, (2) when the mycelium was about to fruit, (3) the fruiting stage. Except in the case of catalase and proteolytic enzymes the amount of extracellular enzymes was larger than the corresponding intracellular ones. *Polyporus ostreiformis* was found to be the most active of the polypores studied.

12.11.2. *Propagation. Growth. Development*

12.11.21 : 12.14.7. GUSTAFSON, F. G. **Parthenocarpy: natural and artificial.** *Bot. Rev.* 8, 1942 (599–654). [University of Michigan.]

12.11.22 : 12.25. CANADA. **National Research Council of Canada: Review of activities for the year ended March, 1941.** Ottawa. 1941. pp. 126. *N.R.C.* No. 1021.

Methods have been developed by which Norway Spruce, White Spruce and White Pine can be successfully propagated from stem cuttings on a practical scale. Studies are now being made in propagation by root cuttings and grafting (pp. 87–8).

12.11.22 : 12.26–8 : 12.11.15. SNOW, A. G. **Sex and vegetative propagation.** *J. For.* 40, 1942 (807–8). [Northeastern Forest Exp. Sta.]

Replicate sets of cuttings, collected from 8 male and 8 female Red Maple trees, were given optimum treatments (cf. *For Abstr.* 3 (108)] and planted in outdoor propagating beds. Results indicate significant differences in rooting between sexes as well as between clones. On the average, cuttings from male trees rooted better than those from female trees.

12.11.22 : 12.26–8 : 12.11.3. FLORY, W. S., and BRISON, F. R. **Propagation of a rapid growing semi-evergreen hybrid Oak.** *Bull. Tex. agric. Exp. Sta.* No. 612, 1942. pp. 32.

A study of methods for propagating first generation hybrid Oaks originally produced from the cross of Live Oak (*Quercus virginiana*) × Overcup Oak (*Q. lyrata*). Successful results have been obtained with whip and bark grafting on suitable stocks (mainly of the White Oak group), while cleft grafting was less successful, T-budding was unsuccessful, and various treatments of cuttings from the original 30-year-old hybrids gave negative rooting results.

12.11.23. OLSSON, R. G. Über die mit der statischen Stabilität verträgliche Höhe eines Baumes. [**On the tree height compatible with static stability.**] *Holz* 5, 1942 (297–8). [G.] P.R.

The theory of stability of columns as conditioned by their weight is summarized and investigations on columns whose cross-section varies according to an exponential curve are reported and applied to trees. The influence of the weight of branches and of the heterogeneity of wood are discussed.

12.11.23 : 12.14.5 : 12.26–8 : 34.26. SELL, H. M., REUTHER, W., FISHER, E. G., and LAGASSE, F. S. **Effect of chemical treatments in prolonging dormancy of Tung buds.** *Bot. Gaz.* 103, 1941–42 (788–93). O.B.D.

12.11.3. *Heredity. Breeding. Hybridization. Races and Questions of Provenance*

12.11.3. DUFFIELD, J. W. **The cytological basis of forest tree improvement.** *J. For.* 40, 1942 (859–64). [Northeastern Forest Exp. Sta.]

A brief account of cells and chromosomes as they behave in development and reproduction is followed by a discussion of problems and lines of research encountered in work on forest genetics and of the importance of cytological studies in dealing with these problems.

12.11.3 : 12.26–8. ALLARD, H. A. **The hybrid Oak, × *Quercus rudkini* at Arlington, Virginia.** *Rhodora* 44, 1942 (262–6 + plate). O.B.D.

Comparison of material from an Oak in Arlington County, Va., believed to be a hybrid between Willow Oak (*Quercus phellos*) and Black Jack Oak (*Q. marilandica*), with that from immediate descendants of a tree in North Carolina, also regarded as a hybrid between these species, showed a marked similarity in characteristics. This hybrid was first described in 1882 and named *Quercus rudkini*.

12.11.3 : 12.26–8 : 12.14.5. DANSEREAU, P., and LAFOND, A. Introgression des caractères de l'*Acer saccharophorum* K. Koch et l'*Acer nigrum* Michx. [**Merging of the characters of *Acer saccharophorum* K. Koch and *Acer nigrum* Michx.**] *Contr. Inst. bot. Univ. Montreal* No. 37, 1941 (15–31). [F.] O.B.D.

From a study of leaf characteristics it appears that, in the northeastern portion of their range, in eastern Canada, *Acer saccharophorum* and *A. nigrum* tend to hybridize, giving rise to a large number of intermediate forms. This process appears to favour the *saccharophorum* group. No specimens of pure *A. nigrum* were found in the colonies studied, while colonies of pure *A. saccharophorum* were of two distinct types.

12.11.3 : 12.26–8 : 12.25 : 44.3. CANADA. **National Research Council of Canada: Review of activities for the year ended March, 1941.** Ottawa. 1941. pp. 126. *N.R.C.* No. 1021.

Work on forest-tree breeding included the production of several hundred new interspecific Poplar hybrids involving nine combinations of species, successful hybridizations in Birch and Elm, and extensive cross pollinations in Pine, including many new species and combinations. A total of 381 seeds was obtained from cross pollinations between White Pine (*Pinus strobus*) and *P. peuce*, which is believed to be resistant to the blister rust (p. 23).

12.11.3 : 23.23.1. MÜLLER, E. Die Beschaffung von forstlichem Saatgut bekannter Herkunft. [**The provision of forest seed of known origin.**] *Schweiz. Z. Forstw.* 93, 1942 (247–51). [G.]

A plea that more attention be paid to the provenance of forest tree seed. It is estimated that of the 11,750 kg. of forest tree seed used annually in Switzerland during 1930–40, 74–84 per cent. was of unknown origin.

12.14. Organography. Morphology. Anatomy. Histology

12.14.3 : 12.11.23 : 12.25 : 11.43.1. PRESTON, R. J. **The growth and development of the root systems of juvenile Lodgepole Pine.** *Ecol. Monogr.* 12, 1942 (449–68). [Colorado State College.]

During the summers of 1939 and 1940 a study was made of the growth and development of the root systems of 105 young Lodgepole Pines (*Pinus contorta* var. *latifolia* Engelm.) ranging from 1 to 15 years of age and growing on two contrasting sites, one a former fire lane on gravelly sand loam soil of glacial moraine origin, and the other a large cut in almost pure gravelly

sand of low fertility. Roots grew much deeper in the former site, but in all other respects root development was greater in the latter. In both cases the majority of the roots occurred in the upper 6 in. of soil. A strong correlation was found to exist between the total top height of a tree and the total linear length of the root system. The number of mycorrhizae present was found to increase as soil fertility got poorer, and between 89 and 100 per cent. of all mycorrhizae occurred in the top 6 in. of soil.

12.14.3 : 12.25 : 23.24.3 : 11.41.3. ADAMS, W. R., and CHAPMAN, G. L. **Competition influence on the root system of Jack and Norway Pines.** *Bull. Vt. agric. Exp. Sta.* No. 472, 1941. pp. 32.

This study was undertaken to determine the distribution of the roots of Jack Pine (*Pinus banksiana*) and Norway Pine (*P. resinosa*) when grown at spacings of 2×2, 4×4, 6×6 and 8×8 ft., and to relate this distribution with soil factors and competition *per se*. These plantations had grown undisturbed for 28 years. The soils are sandy with a relatively low moisture content during dry periods of the growing season. The mean available moisture for the growing season at 4-in. depth usually increased with increased spacing, except for the 4-ft. spaced Jack Pine, while at 12-in. depth moisture percentage increased with increased spacing in Jack Pine but decreased in Norway Pine.

In all cases most of the horizontal roots spread out in the upper soil layers, mainly the A_1 horizon. Root numbers decreased with soil depths to the lower limit of the B horizon below which few horizontals grew. The total number of roots in the upper soil layers of the Jack Pine profiles, with the exception of the 2-ft. spacing, decreased with increase in available growing space, while in Norway Pine increase in growing space was accompanied by increased root production. In the 2- and 6-ft. spacings the horizontal roots of Norway Pine grew to a greater depth than did those of Jack Pine. In the Jack Pine plots the percentage of horizontal roots in the top 4 in. of soil decreased from 77 to 56 as tree spacing widened from 2 to 8 ft., while in Norway Pine the percentage increased from 41 to 62 with the increase in spacing from 2 to 6 ft.

Both species developed strong vertical roots which grew deeply into soils having a sand content above 90 per cent. and a very low moisture equivalent.

12.14.3 : 12.26–8 : 11.41.8 : 11.44. SCULLY, N. J. **Root distribution and environment in a Maple-Oak forest.** *Bot. Gaz.* 103, 1941–42 (492–517). [Hull Botanical Laboratory, University of Chicago.] O.B.D.

An account of investigations carried out during the summers of 1938 to 1940 in a 65-acre tract of Sugar Maple/Red Oak/White Oak forest at Wychwood, Lake Geneva, Wisconsin, in soil profiles of the Bellefontaine silt loam type. Records were made of the number, sizes and distribution of roots in the various soil horizons at 16 selected stations in the area. The greatest concentration of small roots was in the A_1 horizon. Larger roots did not increase in numbers below the A horizons. On the basis of root number and percentage root area, the horizons A_1, A_2, B_1, B_2 and C_1 generally showed successive decrease in suitability for root development, and greater numbers of dead roots occurred in the lower horizons. Areas with a sparse ground cover showed fewer roots but a comparatively high percentage of root area, whereas larger root numbers and smaller percentage root area occurred where the ground cover was more dense.

12.14.7 : 12.26–8. BUCHHOLZ, J. T. **Multi-seeded acorns.** *Trans. Ill. Acad. Sci.* 34, 1941 (99–101) [University of Illinois, Urbana.] N.H.M.

A note on two specimens of Southern Red Oak (*Quercus falcata*) that have, over a period of 23 years, produced numerous acorns containing several seeds. Whereas normally the development of all but one of the six ovules is checked early in the second season and they become aborted, in the case reported a number of the ovules enlarged and developed to maturity.

12.19. Geographical Distribution. Plant Geography and Sociology

12.19 (701) : 11.21. GRIGGS, R. F. **Indications as to climatic changes from the timberline of Mount Washington.** *Science* (*n.s.*) 95, 1942 (515–9). [National Research Council.] L.S.

Historical and botanical evidence points to the fact that in Alaska the trees are slowly advancing into the tundra, an indication that the climate in this part of the world has recently become more favourable for tree growth. On the other hand, it appears that in the northeastern portion of the continent the timber line is retreating southwards. The presence of established trees in regions where seedling growth is now impossible, and of large stumps in areas of diminutive tree growth can be explained only by the supposition that in these areas the climate has recently worsened. Historical evidence points to the probable truth of this supposition. Whether these climatic variations are merely of historical importance, or are of consequence geologically, cannot be ascertained.

12.19 (75) : 12.19.2–3 : 60.3 : 11.41.7 : 11.62.21 : 42.5 : 43. WELLS, B. W. **Ecological problems of the southeastern United States coastal plain.** *Bot. Rev.* 8, 1942 (533–61). [North Carolina State College.]

A review of the literature which includes data on swamp forests, White Cedar (*Chamaecyparis thyoides*) bogs, savannas, and Longleaf Pine forests and their management. All evidence indicates that the extensive Pine forests are fire sub-climaxes.

12.19 : 12.26–8 (494). ETTER, H. Die natürliche Verbreitung und Vergesellschaftung der Eiche in der Nordostschweiz. **[Natural range and association of Oak in north-east Switzerland.]** *Schweiz. Z. Forstw.* 93, 1942 (255). [G.]

12.19 : 12.26–8 : 11.42.31. MALONEY, M. M. **Revegetation of coal stripped land near Henryetta, Oklahoma.** *Proc. Okla. Acad. Sci.* 22, 1942 (123–9). A.P.B.

A study of the vegetation of land formerly of typical prairie formation from which the surface soil was stripped 40 years ago in order to mine coal, and subsoil materials containing large quantities of iron sulphide deposited on the surface. The soil is now very acid and the rather sparse vegetation consists mainly of trees and shrubs. *Ulmus americana* is the present dominant species with *Platanus occidentalis* and *Populus deltoides* as subdominants, and *Diospyros virginiana* is relatively prolific.

12.19.1. *Regional Floras*

12.19.1 (494). AHRENS, T. G. **Deciduous trees around Geneva, Switzerland.** *Trees, Sta. Monica, Calif.* 5 (5), 1942 (13).

The main indigenous and exotic species are named.

12.19.1 (54.2) : 11.45. MOONEY, H. F. **A short account of the geology and flora of the hill Zamindaries in Kalahandi State.** *Indian For. Rec. (n.s.) Botany* 3, 1941 (131–43 + plates).

The area of 1,400 sq. miles consists largely of an extensive plateau 2,000–3,000 ft. above sea-level, from which rise several hills over 3,500 ft. The basic rocks are ancient gneisses and schists; the climate is generally moist and cool; and the vegetation has been greatly modified by a long period of shifting cultivation.

The flora may be divided into five regional types:—1. The outer slopes of the plateau, from 1,000 to 2,000 ft. where the vegetation is mainly mixed deciduous forest. 2. The open valleys of the main plateau, 2,000 to 3,000 ft. Here the fringe of forest is not extensive and stretches for only 50–60 yd. on either side of the streams. Occasionally there are only a few scattered trees. 3. The ravines between 2,500 and 3,500 ft. where there is restricted growth of damp-type evergreen flora. 4. The upper slopes of the higher hills, 2,500–3,500 ft. Here the forest is mostly second growth, the vegetation consisting mainly of islands of Sal forest in a dry deciduous scrub jungle. The flora is becoming progressively xerophilous. 5. The high plateau, 3,500–4,000 ft. This area is composed of grassland, with a few stunted trees such as Sal and *Emblica officinalis* along the watercourses.

The principal species of each region are named.

12.19.1 (76.9) : 12.25 : 12.26–8 : 11.45 : 21.3. MCANTEER, B. B. **Distribution of the woody plants of Kentucky in relation to geologic regions.** *Bull. Ky. Dep. Mines & Minerals* Ser. VIII (6), 1941. pp. 20.

Includes tables showing the relative abundance of various species of woody plants in the nine main soil areas of Kentucky and indicating the tolerance of some plants to soil conditions.

12.19.1 (77.3) : 12.25 : 12.26–8. EVERS, R. A. **The trees of Adams County, Illinois.** *Trans. Ill. Acad. Sci.* 34, 1941 (98–9). N.H.M.

12.19.1 (79.2) : 12.25 : 12.26–8 : 91.5 : 33.0. TERRY, W. Z. **Native trees of Utah and the uses made of them by the early settlers.** *Proc. Utah Acad. Sci.* 17, 1940 (115–17). N.H.M.

Mainly a list of the native coniferous and broad-leaved deciduous trees with brief descriptions of their local habitats and uses.

12.19.1 (91.4) : 31.0. SALVOZA, F. M., and LAGRIMAS, M. **Check list of the trees of the Philippines with brief notes on their uses.** *Philipp. J. For.* 3; 1940 (477–547); 4, 1941 (63–104, 191–218, 285–313). [Bureau of Forestry, Philippines.]

The check list is based upon 'An enumeration of Philippine flowering plants' by Merrill, but it includes also some species published in Hooker and Jackson's 'Index Kewensis' and its supplements from 1895 to 1935, and in Elmer's 'Leaflets of Philippine Botany' up to 1939. The first four sections of the work deal with 13 orders of Spermatophytes. The nomenclature, habitat, range, uses and local names are given for each species recorded. The families represented are Taxaceae, Pinaceae, Gnetaceae, Casuarinaceae, Betulaceae, Fagaceae, Myricaceae, Juglandaceae, Salicaceae, Ulmaceae, Moraceae, Urticaceae, Proteaceae, Santalaceae, Opiliaceae, Olacaceae, Polygonaceae, Phytoloccaceae, Nyctaginaceae, Euphorbiaceae, Dichapetalaceae, Hamamelidaceae, Magnoliaceae, Anonaceae, Myrtisticaceae, Monimiaceae and Lauraceae.

12.19.1 (943). BLAKE, S. T. **The vegetation of Running Creek valley, south-east Queensland, and some neighbouring areas.** *Qd. Nat.* 12, 1942 (4–12 + plates). L.S.

In this study the vegetation is considered under five heads. The primary vegetation includes (1) closed forest, (2) open forest, (3) vegetation of stream banks and beds, (4) swamps; the secondary vegetation includes (5) artificial and induced vegetation. The distribution and composition of each group is considered in some detail. The closed forest is generally well developed and much of it can be classed as rain forest. Tree species include *Tarrietia actinophylla*, *Geissios lachnocarpa*, *Villaresia moorei*, and *Araucaria cunninghamia* (in some localities). On shallow or stony soils there are forest remnants of a drier type composed mainly of small trees and shrubs about 20 ft. high. *Croton insularis* is characteristic of this type. The open forest is dominated by species of *Eucalyptus*. Two main types can be distinguished: the *Eucalyptus tereticornis*/*Angophora subvelutina* forest in the broader lower parts of the valley, giving way on the upper slopes to a type dominated by other species of *Eucalyptus* with *Casuarina torulosa* forming an understorey. In part of the area the stream-bank vegetation is a fringing forest type consisting of a narrow belt of trees, mainly *Casuarina cunninghamiana* and *Callistemon viminalis*. Elsewhere the closed forest comes down to the streams, and tall straight specimens of Flooded Gum (*Eucalyptus saligna* or *E. grandis*) are prominent. Much of the area that has been cleared of forest is now covered with herbaceous vegetation, due either to artificial sowing or to thickening of the natural herbaceous cover.

12.19.2. *Forest Types*

12.19.2 (73) : 01.3 : 04.4. REINEKE, L. H. **Legend for Society of American Foresters: forest cover types for the eastern United States.** *Occ. Pap. Ntheast. For. Exp. Sta.* No. 13, 1941. pp. 12 + plates.

A set of symbols supplementing the Society's list of type names published in 1932. The paper also includes general notes on the technique of drawing and colouring ecological maps.

12.19.2 (79.4) : 12.25. OOSTING, H. J., and BILLINGS, W. D. **The Red Fir forest of Sierra Nevada (Abietum magnificae).** *Abstr.* in *Bull. ecol. Soc. Amer.* 23, 1942 (74). [Duke University.] I.F.B.

Geobotanical investigations were made of the virgin Red Fir (*Abies magnifica*) forest of the Sierra Nevada of California. Sixteen stations were studied which ranged from Yosemite Valley on the south to Lassen Peak on the north. Presence lists for all stations and intensive vegetational and soil analyses for five stations were used to determine the characteristics of the community. The association is restricted to the subalpine zone of the Sierra Nevada and reaches its best development on the deepest soils. Its limits are correlated with the prevailing climate which is winter-wet with heavy snowfall and summer-dry with a short growing season.

The association is designated the Abietum magnificae and usually consists of four unions of vascular plants, namely: the *Abies magnifica* arborescent union, the *Ribes-Symphoricarpos* frutescent union and two herbaceous unions, the *Chrysopsis-Monardella* and *Pirola-Corallorhiza*. The Abietum magnificae is true climax

at medium-high elevations and is the Sierran example of the Spruce-Fir boreal forest.

12.19.2 (481) : 64 : 11.41. ARNBORG, T. De viktigaste norrländska skogstyperna. **[The most important forest types of Norrland.]** *Svenska Vall- och Mosskulturföreningens Kvartalsskrift* 4 (2), 1942 (183–98). [Sw.] [Plant-biological Institute of the University of Uppsala.] A.P.B.

In the majority of forest-type systems the ground flora constitutes the starting point and classification is based on its appearance and composition. This basis of classification has been used in Sweden (mainly for Norrland) by O. Eneroth and E. Ronge, and follows in general the principles laid down by A. K. Cajander in 1909, and since then adhered to in Finland.

In the floristic characterization of forest types the starting point is the composition of the ground flora in closed forests. The same forest type includes a series of stages or phases which follow one another, in which the appearance of the ground vegetation depends on the age and closeness of the tree layer. Thus a number of ground vegetation types may occur in one and the same forest type. In addition to determining the forest type according to the vegetation, it is important through a direct investigation to obtain knowlege of the soil factors, particularly soil type, moisture conditions and physical structure of the soil, and also to measure and describe the soil profile. A brief conspectus of the principal forest types of Norrland is given. To the paper is appended a list of the most important publications relating to the subject of forest types.

12.19.2 (74) : 22.88.1 : 12.19.4. CLINE, A. C., and SPURR, S. H. **The virgin upland forest of central New England: a study of old growth stands in the Pisgah Mountain section of southwestern New Hampshire.** *Harv. For. Bull.* No. 21, 1942. pp. 58 + table.

This *Bulletin* is based on a study of 68 plots in virgin forest remnants and 23 plots in recently cut-over areas of old growth on an area of some 5,000 acres in Cheshire County, New Hampshire. Within this area elevations range from about 700 ft. above sea-level to just over 1,300 ft., the slopes are generally steep and soils are mostly thin and stony.

The composition of the virgin forest was found to vary widely and seven distinct cover types were recognized, the distribution of which was related to elevation and aspect as follows:—the Hemlock, Hemlock/Beech, and Beech/Birch/Sugar Maple types were predominant on low and mid-slopes, the White Pine, White Pine/Hemlock/Red Oak, and Red Oak types on high slopes and ridge tops, and the White Pine/Hemlock type in an intermediate position. Analysis of the forest composition in this way left much of its variation unexplained. However, when other factors relating to the past stand history, particularly the occurrence and severity of fire, wind and other natural forces of destruction, were taken into account few important differences in composition remained unexplained. It was found that natural disturbances of greater or less violence had markedly affected composition in over 80 per cent. of the stands, and the various successional stages thus brought about, coupled with the effects of elevation, aspect and other factors of site, made the virgin forest highly variable in composition, density and form.

In considering the forest composition on an ecological basis, two climax associations were recognized:—(1) the climatic climax, found on lower slopes, consisting primarily of Hemlock, Beech, Sugar Maple and Black Birch, and (2) the ridge top physiographic climax, a Hemlock/White Pine association, with Beech, Black Birch and Red Maple as minor components. Pre-climax associations included:—(1) those which followed old partial disturbances and which closely approach the climax in composition and stability; (2) those which followed old severe disturbances and are early pre-climax in character; and (3) those following recent disturbances and composed of late pioneer stands. The complete destruction of a stand was generally followed by the establishment of even-aged stands of White Pine, Red Oak and some Hemlock, and as these stands approached old age, Hemlock, Beech and Black Birch gradually replaced the pre-climax species, and were supplemented on the best sites by Sugar Maple, Yellow Birch, White Ash and Basswood.

True podzol profiles had developed throughout the virgin forest under all cover types, and depth of soil horizon was related to stand composition. In general, the accumulation of organic matter was greatest and the leached horizon the thickest under conifers, particularly White Pine; while the dark brown, enriched horizon reached its greatest depth under stands containing a large proportion of hardwoods.

12.19.3 : 45.3 : 12.26–8 : 13.2. GATES, W. H. **Observations on the possible origin of the balds of the southern Appalachians.** *Contr. Dep. Zool. La. St. Univ.* No. 53, 1941. pp. 16. [Louisiana State University.]

From the study described by the author it appears that the natural balds of the southern Appalachians may be caused by infestation of Red Oak by *Andricus gemmarius* or a similar twig-gall wasp.

12.2. *Special* [*Systematic*] *Botany*

12.2 : 12.11.3. TURRILL, W. B. **Taxonomy and phylogeny.** *Bot. Rev.* 8, 1942 (247–70, 473–532, 655–707). [Royal Botanic Gardens, Kew.]

12.21. Fungi

12.21. BAXTER, D. V. **Some resupinate polypores from the region of the Great Lakes. XIII.** *Pap. Mich. Acad. Sci. 1941* 27, 1942 (139–61 + plates). [University of Michigan.] L.S.

Descriptions and notes on the polypores *Trametes serialis* and *T. alaskana* with discussion of the related forms *T. heteromorpha* and *T. variiformis*. These fungi are an important source of decay particularly in Spruce timber and in other conifers and a few hardwoods.

12.21 : 12.11 : 12.14. DÉFAGO, G. Seconde contribution à la connaissance des Valsées von Höhnel. **[Second contribution to the knowledge of the Valseae von Höhnel.]** *Phytopath. Z.* 14, 1942 (103–47). [F.f.] R.A.M.

Confirming his studies in Switzerland on the Valsaceae, the writer describes the morphological, physiological, and cultural characters of certain species including *Valsa ceratophora* Tul., to which special attention was paid.

12.21 (74.8) : 31.42.11. OVERHOLTS, L. O. **The Polyporaceae of Pennsylvania III. The genus *Poria*.** *Bull. Pa. agric. Exp. Sta.* No. 418, 1942. pp. 64. R.A.M. 22 (40).

The author gives a list of 69 species (including eight new ones) of *Poria* occurring in Pennsylvania. A key

is provided and detailed descriptions given for all species. *P. callosa* is described as the cause of an important decay of coniferous structural timber, *P. unita* (Pers.) Cooke, is common on hardwood structural timbers throughout the United States and Canada, and other species prevalent on structural timber are *P. vaillantii* and *P. incrassata*, one of the most destructive decay fungi. *P. cinerescens* is stated to be of considerable importance as an agent of decay of conifer slash.

12.21 (75.9) : 44.3 : 12.26–8. MURRILL, W. A. **New fungi from Florida**: *Lloydia* 5 (2), 1942 (136–57). R.A.M. 21 (504).

Includes a new variety, *Rigidoporus surinamensis subauberianus*, found on the base of a living Laurel Oak (*Quercus laurifolia*) and apparently intermediate between *R. surinamensis* and *Fomes auberianus*.

12.21 : 31.42.12. VERRALL, A. F. **A comparison of *Diplodia natalensis* from stained wood and other sources.** *Phytopathology* 32, 1942 (879–84). [Bureau of Plant Industry, U.S.D.A.]

As *Diplodia natalensis* rarely produces spores when growing on logs, experiments were made to determine whether the inoculum causing stain on lumber may have been derived from spores produced by the fungus on other plants. A comparison between *D. natalensis* obtained from stained wood and isolates of this or similar fungi from cotton, citrus, pear and tung plants showed that the isolates from the stained lumber did not differ materially from those obtained from other sources, and all of 13 isolates tested on Pine and Sweet Gum sapwood caused staining of these species.

12.21 : 33.36.1. CHRISTENSEN, C. M., KAUFERT, F. H., SCHMITZ, H., and ALLISON, J. L. ***Hormodendrum resinae* (Lindau), an inhabitant of wood impregnated with creosote and coal tar.** *Amer. J. Bot.* 29, 1942 (552–8). [University of Minnesota.] O.B.D.

A brown mould, tentatively identified as *Hormodendrum resinae*, is a common inhabitant of coal-tar- and creosote-treated wood. This fungus seems unable to survive competition with common moulds under normal conditions, but, unlike them, it can tolerate high concentrations of creosote and coal tar which it appears capable of using as a source of nourishment. There is no evidence that it affects the strength of the wood which it infects. In most of the samples examined an unidentified bacterium was also present.

12.21 (79.5) : 44.3. COOKE, W. B. **Resupinate pore fungi in Oregon.** *Amer. Midl. Nat.* 27, 1942 (677–95). L.S.

A discussion of the genus *Poria*. The main group of the genus referred to as *Poria proper* includes important slash-rot fungi and forest pathogens. A key to the species is followed by brief notes on the structure and habit of 39 resupinate polypores, some of which are of economic importance.

12.25. Gymnosperms

12.25 : 21.61. SCHRAMM, J. R. **An interesting variant of White Spruce.** *Bull. Morris Arbor.* 3, 1941 (67–9).

With reference to a single tree growing in a clump of White Spruce trees in the Acadia National Park, Maine. It differs from typical White Spruce in having a very dense, compact outer surface, 8 to 12 in. deep, caused by branching at the periphery. The name proposed for this variant is *Picea glauca* (Moench.) Voss. forma *buxoides* forma nova.

12.25 (79.4) : 21.0. SMITH, C. O. **Trees of *Agathis* in California.** *Trees, Sta. Monica, Calif.* 5 (5), 1942 (7, 18). [University of California Citrus Exp. Sta.]

Agathis robusta, *A. australis* and *A. orientalis* have all been introduced into California, but *A. robusta* seems best suited to local conditions. Descriptions are given of individual trees of the latter species.

12.25 : 12.11.11. MIROV, N. T. **Possibility of simple biochemical tests for differentiation between species of genus *Pinus*.** *J. For.* 40, 1942 (953–4). [California Forest and Range Exp. Sta.]

In a mixed population of Ponderosa Pine (*Pinus ponderosa*), Jeffrey Pine (*P. jeffreyi*) and hybrids between the two species, morphological characters are of little importance in segregating the intermediate forms and hybrids into their proper groups, and such segregation is dependent on differences in the constituents of the oleoresin and on their biochemical identification. The author reports a simple colorimetric test for identifying two species of Pine on this basis.

12.25 : 12.11.23 : 12.14. LOOBY, W. J., and DOYLE, J. **Formation of gynospore, female gametophyte, and archegonia in *Sequoia*.** *Sci. Proc. R. Dublin Soc.* 23, 1942 (35–54). [University College, Dublin.] O.R.S.

The origin of the gynospore and the development of the female gametophyte up to the fertilization stage are described for *Sequoia sempervirens* and *Wellingtonia gigantea*. The considerable differences in development between these species noted in the present paper together with the differences recorded by Buchholz [cf. *For. Abstr.* 1, (247)] indicate that the Sierra Redwood, commonly known as *Sequoia gigantea* cannot be retained as a species of *Sequoia*. The new generic title *Sequoiadendron* suggested for *Sequoia gigantea* by Buchholz in place of *Wellingtonia* is temporarily not accepted. *Sequoia gigantea* (Lindl.) Deen., the Big Tree, the Sierra Redwood, becomes again *Wellingtonia gigantea* Lindl. *Sequoia sempervirens* (Lamb.) Endl., the Coast Redwood, the Redwood, retains this name.

12.25 : 12.1 : 23.11. ALLEN, G. S. **Douglas Fir (*Pseudotsuga taxifolia* (Lamb.) Britt.): a summary of its life history.** *Res. Note B.C. For. Serv.* No. 9, 1942. pp. 27.

The life history of *Pseudotsuga taxifolia* is outlined, special attention being paid to natural regeneration. Stress is laid on the necessity of a sufficient seed source in order to restock cut-over areas satisfactorily. Three silvicultural systems are indicated whereby adequate reproduction may be more or less assured. These include:—(1) Clear-cutting of small areas, 50 to 100 acres in size, depending upon the number of margins of uncut timber and the shape of the cutting. (2) Clear-cutting in large areas with the provision that all areas beyond the adequate restocking zone be provided with seed trees sufficient to bring the stocking up to normal. (3) Clear-cutting in large areas with the provision that all areas beyond the adequate restocking zone be brought up to normal stocking artificially. It is of particular importance that slash burning should be carried out in such a way that seed-bearing or potential seed-bearing trees are not damaged or destroyed.

12.26–8. Dicotyledons

12.26–8. **New American Holly discovered.** *J. For.* 40, 1942 (881).

The new Holly (*Ilex opaca* var. H. L. Russell) carries

its crop of berries for two years. Only a few trees of this variety are at present known to exist.

12.26–8. BALL, C. R. **Far western novelties in *Salix*.** *Madroño* 6, 1942 (227–39). [U.S. Department of Agriculture.] K.

Includes two new varieties of *S. pulchra* Cham.—*S. pulchra* var. *looffiae* var. nov. from Alaska and *S. pulchra* var. *palmeri* var. nov. from Alaska and the Yukon—and the new specific and varietal combinations *S. walpoleii* (Coville and Ball) comb. nov. from Alaska and the Northwest Territories, *S. hindsiana* Benth. var. *leucodendroides* (Rowlee) comb. nov. from California and Mexico, and *S. hindsiana* var. *parishiana* (Rowlee) comb. nov. from southwestern California.

12.26–8. CROIZAT, L. **Identification of Japanese Maples.** *Amer. Nurseryman* 76 (9), 1942 (5–7).

Two species of Japanese Maples are distinguished according to leaf characters. The Fullmoon Maple (*Acer japonicum*) normally carries about eleven lobes to a leaf, whereas the Japanese Maple (*A. palmatum*) carries seven lobes.

12.26–8. GILLY, C. L. **Two new species of Caryocaraceae from northern South America.** *Trop. Woods* No. 72, 1942 (16–18). [New York Botanical Garden.]

The new species are *Anthodiscus mazarunensis* Gilly, sp. nov., and *Caryocar krukovii*, sp. nov. The former species seems most closely allied to *Anthodiscus montanus* Gleason, of Colombia, and *A. amazonicus* Gleason & Smith, from the basin of the Rio Madeira in Brazil. *Caryocar krukovii* most closely resembles *C. parviflorum* A. C. Smith, of the Rio Madeira basin.

12.26–8. HOWARD, R. A. **Studies of the Icacinaceae, III: a revision of Emmotum.** *J. Arnold Arbor.* 23, 1942 (479–94 + plates). [Gray Herbarium, Harvard University.]

The genus is redefined, a key is provided to the 12 species, four of which are new, and descriptions, synonymy and distribution are given for each.

12.26–8. HOWARD, R. A. **Studies of the Icacinaceae IV. Consideration of the New World genera.** *Contr. Gray Herb. Harv.* No. 142 [1942?] (3–60 + plates). Li.U.

Includes a brief outline of the history and systematic position of the family, its geographical distribution and economic uses, and keys to the genera. The genera described are *Calatola, Discophora, Ottoschulzia, Oecopetalum, Dendrobangia, Pleurisanthes, Poraqueiba* and *Casimirella. Emmotum, Citronella, Mappia, Leretia* and *Humirianthera* are dealt with more fully in separate papers and receive only passing mention.

12.26–8. HOWARD, R. A. **Studies of the Icacinaceae V. A revision of the genus *Citronella* D. Don.** *Contr. Gray Herb. Harv.* No. 142 [1942?] (60–89 + plates). Li.U.

Description and distribution of the genus and the various species. The genus is divided into two sections —*Eucitronella* and *Eucharies sa*, and a key is given to the species in each section.

12.26–8 : 21 : 3. LARSEN, E. L. (Translator). **Pehr Kalm's observations on Black Walnut and Butternut trees.** *Agric. Hist.* 16, 1942 (149–57). O.A.E.C.

Translation of two articles by Pehr Kahm, eighteenth-century Swedish botanist, entitled 'Norr-Americanska svarta Valnöt-trädets egenskaper och nytta' [The characteristics and uses of the North American Black Walnut tree] and 'Om Hvita Valnotträdets egenskaper och nytta' [The characteristics and uses of the White Walnut tree], the former published in 1767 and the latter in 1769. The articles include information on the habitat, characteristics, and uses of *Juglans nigra* and *J. cinerea.*

12.26–8. PIERCE, J. H. **The American species of *Daubentonia* (Leguminosae).** *Trop. Woods* No. 72, 1942 (12–15). [New York Botanical Garden.]

Daubentonia punicea (Cav.), a native of South Brazil and Argentina, was introduced at an early date into the southern United States and is now well established in Florida and occurs sparingly in Texas. *D. texana* Pierce sp. nov. (*D. drummondii* Rydb.) is known from the coastal plain of Texas inland along the rivers to southeastern Arkansas and along the Gulf coast to western Florida. There appear to be no authentic specimens from Mexico. The specific epithet *drummondii* employed by Rydberg is treated as a nomen confusum and the species has been renamed as a new species. Examination of the third species, *D. virgata* (Cav.) Rydb. seems to indicate that it is identical with *Glottidium vesicarium* (Jacq.) Harper and should therefore be excluded from the genus *Daubentonia.*

12.26–8 : 01.2. REDMAN, K. **Nomenclature confusion in the case of the Balsam Poplar or Tacamahac.** *J. Amer. pharm. Ass. (Sci. Ed.)* 31, 1942 (220–3). [University of Toledo, Toledo, Ohio.] P.S.G.B.

12.26–8. SYMINGTON, C. F. ***Upuna*, a new genus of the Dipterocarpaceae.** *Repr.* from *Bull. bot. Gdns., Buitenzorg* 17, Ser. 3, 1941 (88–95 + plate). [Forest Research Institute, Kepong, F.M.S.]

A detailed description of this large Dipterocarp which may reach a height exceeding 150 ft. and is widely distributed in west and south Borneo, especially on low-lying, flat, but well-drained land or on the lower hills. The timber is reported to be very durable, and has been used for heavy construction at the Seriah oil-fields. The tree is probably of phylogenetic significance in that it may prove a link between the aberrant sub-family of the Monotideae and Dipterocarpoideae or typical Dipterocarps.

12.26–8 (51). METCALF, F. P. **Additional notes on *Acer*.** *Lingnan Sci. J.* 20, 1942 (219–26). [Lingnan University, Canton, China.] L.S.

With reference to the genus in southeastern China. Notes are included on one new species and three new varieties, and on extensions of the range of several known species; the author discusses briefly the group to which *Acer tuteheri* belongs.

12.26–8 (51). METCALF, F. P. **Notes on *Chloranthus, Betula, Lithocarpus* and *Quercus*.** *Lingnan Sci. J.* 20, 1942 (215–8). L.S.

Descriptions of a few new species found in Fukien and southeastern China, including *Betula kwangsiensis* Metcalf, sp. nov., a tree up to 20 m. high; also a brief note on *Quercus macrocalyx* Hockel and Camus var. *tomentosa* Metcalf.

12.26–8 (72 : 728). KOBUSKI, C. E. **Studies in the Theaceae, XIII. Notes on the Mexican and Central American species of *Ternstroemia*.** *J. Arnold Arbor.* 23, 1942 (464–78). [Arnold Arboretum, Harvard University.]

The various characters used in specific delimitation throughout the genus are briefly discussed. A key is provided to the nine species, two of which are new,

llowed by descriptions, synonymy and distribution of ch.

2.26–8 (728 : 8) : 12.19 : 32 : 31.2. PIERCE, J. H. **Balsa–ghtweight champion timber tree.** *J. N.Y. bot. Gdn.* 43, 942 (268–77).

Note on the distribution, growth characteristics and roduction of Balsa in Central and South America and n the uses of Balsa timber.

2.26–8 (73). PALMER, E. J. **The Red Oak complex in e United States.** *Amer. Midl. Nat.* 27, 1942 (732–40). S.

A discussion of tree characters and geographical nges for five species and several varieties of Red Oaks *Coccineae*). A key is provided. The species and rieties considered include *Quercus borealis*, *Q. orealis* var. *maxima*, *Q. shumardii*, *Q. shumardii* var. *hneckii*, *Q. shumardii* var. *texana*, *Q. shumardii* var. *erifolia*, *Q. coccinea*, *Q. coccinea* var. *tuberculata*, *Q. lipsoidalis*, *Q. nuttallii*, *Q. nuttallii* var. *cachensis*.

2.26–8 (76.1) : 12.19. HARPER, R. M. ***Quercus acrocarpa* in Alabama.** *J. Elisha Mitchell sci. Soc.* 58, 942 (60–3 + plate). L.S.

A number of specimens of *Q. macrocarpa* have been und in Alabama, which suggests that this species is a ember of the indigenous flora of that State. Charac-ristics of this species noted in the course of the study clude extreme variability of the form of acorns, even hen taken from the same tree, and the fact that the rimary leaves of young seedlings are sinuate-toothed nd not lobed as are those of mature trees.

2.26–8 (76.6). HOPKINS, M. ***Cercis*, its taxonomic lationship in the Oklahoma flora.** *Proc. Okla. Acad. ci.* 22, 1942 (130–1). [University of Oklahoma.] .P.B.

Only one species of *Cercis* occurs in Oklahoma, amely *C. canadensis*. Two varieties and one form are amed and a brief synopsis given of their chief haracters.

2.26–8 (76.9). MCFARLAND, F. T. **A catalogue of the scular plants of Kentucky.** *Castanea* 7, 1942 (77–108).

2.26–8 (81). BARROSO, L. J. Chaves para determin-ação de gêneros brasileiros e exóticos das dicotil-lôneas mais cultivadas no Brasil. [**Keys for the etermination of Brazilian and exotic genera of di-otyledons commonly grown in Brazil.**] *Bull. Secção de otânica, Serviço Florestal, Rio de Janeiro* 1, 1942. . 126. [Port.] *Trop. Woods* No. 72, 1942 (40).

Contains 144 family keys to the genera (837 in all). he arrangement of the families is alphabetical. The stinguishing features are simplified as much as possible nd further clarified by 114 drawings. A second volume this work is in preparation.

.26–8 (86). DUGAND, A. Dos adiciones a las pecies nuevas colombianas del genero *Ficus*. [**Two ditions to the new Colombian species of the genus cus.**] *Caldasia, Bogotá* 5, 1942 (37–9). [Span.] *op. Woods* No. 72, 1942 (40).

The two new species described are *Ficus chaponensis* ugand and *F. soatensis* Dugand. Both are small es; the latter is known locally as Chipio.

.26–8 (87). LASSER, T. Lauraceas nuevas de nezuela. [**New Lauraceae of Venezuela.**] *Bol. téc. in. Agr. y Cria, Caracas* No. 3, 1942. pp. 19. [Span.] *op. Woods* No. 72, 1942 (40).

Fifteen new species of Lauraceae are described and figured. The genera are *Beilschmiedia* (1), *Endlicheria* (1), *Nectandra* (6), *Ocotea* (5), and *Pleurothyrium* (2).

12.26–8 (91). CROIZAT, L. **New and critical Euphorbia-ceae from the tropical Far East.** *J. Arnold Arbor.* 23, 1942 (495–508). [Arnold Arboretum, Harvard University.]

Descriptions of 22 species of *Croton*, including 13 new species and two new varieties, and one species each from the genera *Claoxylon*, *Ostodes*, *Cheilosa*, and *Sapium*.

12.26–8 (95). ALLEN, C. K. **Studies in the Lauraceae, IV. Preliminary study of the Papuasian species collected by the Archbold expeditions. V. Some eastern Asiatic species of *Beilschmiedia* and related genera.** *J. Arnold Arbor.* 23, 1942 (112–31, 133–55, 444–63). [Arnold Arboratum, Harvard University.]

The study is based principally on the three Brass collections from British and Netherlands New Guinea, but species from other collections are also included. Species of the following genera are described: *Cinnamomum* (3), *Phoebe* (1), *Nothaphoebe* (1), *Actinodaphne* (4), *Neolitsea* (3), *Litsea* (17), *Beilschmiedia* (3), *Cryptocarya* (23), *Endiandra* (14), *Brassiodendron* gen. nov. (1) and *Cassytha* (3).

The eastern Asiatic genera represented in Part V are *Dehaasia* (1), *Beilschmiedia* (17), *Cryptocarya* (10), *Lauromerrilia* gen. nov. (1), *Endiandra* (1), and *Syndiclis* (1).

12.26–8 (95). SMITH, A. C. **Studies of Papuasian plants, V.** *J. Arnold Arbor.* 23, 1942 (417–43). [Arnold Arboretum, Harvard University.]

Mainly a discussion of the Winteraceae in New Guinea and the Solomon Islands, represented by the genera *Drimys* and *Bubbia* in the former and *Belliolum* in the latter region. Many of the species described from these genera are small trees or shrubs, the largest (*Belliolum haplopus*) being up to 15 m. high. Also included are brief notes on two genera of Magnoliaceae —*Talauma* and *Elmerrillia*—and two genera of Monimiaceae—*Trimenia* and *Dryadodaphne*—each represented by one species. *Elmerrillia papuana* is a tree 23 m. high, found occasionally in primary rain forest on the slope of a ridge.

12.26–8 (95). MERRILL, E. D., and PERRY, L. M. **Plantae Papuanae Archboldianae, X.** *J. Arnold Arbor.* 23, 1942 (383–416). [Arnold Arboretum, Harvard University.]

New tree species are described in the genera *Archidendron*, *Serianthes*, *Pithecellobium*, *Albizzia*, *Acacia*, *Adenanthera*, *Piptadenia*, *Parkia*, *Cynometra*, *Maniltoa*, *Kingiodendron*, *Crudia*, *Bauhinia*, *Ormosia*, *Tetrameles*, *Geniostoma*, *Couthovia*, *Fagraea*, *Mastixiodendron*.

13.1. *General Zoology*

13.1. IMMS, A. D. **Outlines of entomology.** Methuen & Co. Ltd., London. 1942. pp. vii + 184.

The aim of this book is clearly stated by the author in the preface, and its attainment should do much to place entomology in its proper place as a most important branch of general zoology. We may hope that the days are gone when marine forms have the prime place in the curriculum of types, and the insects are left with the cockroach to represent them. The suggestion, also, that schools will study the work is indicative of the progress made in the teaching of biology in recent years.

The production of the book is on a high level for the times, and the illustrations are extremely clear. The more important point which should strike every reader is the skill with which the author has manipulated the vast quantity of matter at his disposal into such a comparatively limited space. The foundation which the book provides for further advanced study is solid and extensive. R. N. C.

13.1 (469). SEABRA, A. F. DE. Contribuição para a história da entomologia em Portugal a secção entomológica do laboratório de biologia florestal. [**Contribution to the history of entomology in Portugal by the entomological division of the laboratory of forest biology.**] *Publ. Serv. Flor. Port.* 6 (1), 1939. pp. 148. [Port.]

13.13 : 13.2. BEARD, R. L., and WALLACE, P. P. **Prothetely in *Scolytus multistriatus* Marsham (Coleop.: Scolytidae).** *Repr.* from *Ent. News*, 52, 1941 (242–4). [Connecticut Agricultural Exp. Sta.]

13.14 : 13.15 : 13.2 : 12.26–8. MICHEL, E. Beiträge zur Kenntnis von *Lachnus* (*Pterochlorus*) *roboris* L., einer wichtigen Honigtauerzeugerin an der Eich.. [**Contributions to the knowledge of *Lachnus roboris* L., an important producer of honey-dew on the Oak.**] *Z. angew. Ent.* 29, 1942 (242–81). [G.g.] [Zoologisches Institut der Universität Freiburg i. Br.] I.I.E.

An account is given of the biology and anatomy of the Aphid *Lachnus roboris* and of the production and composition of the honey-dew which it produces in considerable quantity on Oaks in Germany.

13.19 : 07.7. LAWSON, F. R., FOX, D. E., and COOK, W. C. **Three new devices for measuring insect populations.** Bureau of Entomology and Plant Quarantine, U.S.D.A. *Mimeo.* No. ET–183, 1941. pp. 6 + figs.

13.19 : 13.2. EVANS, F. C. **Studies of a small mammal population in Bagley Wood, Berkshire.** *J. Anim. Ecol.* 11, 1942 (182–97). [Bureau of Animal Population, Oxford University.]

The chief species studied were the wood-mouse (*Apodemus sylvaticus*) and the bank-vole (*Clethrionomys glareolus*). The range of the former appeared to b rather wider than that of the latter, but both specie tended to restrict their activities to a fairly small hom range. Highest catches of *Apodemus* were made in th Spruce, Larch and Cedar woods, while Beech and Oa stands and young broadleaved plantations seemed to b more or less avoided. The greatest numbers o *Clethrionomys* were caught in bracken (*Pteridiu aquilinum*) areas, while Spruce, Cedar, Larch, Beech an Oak stands were generally avoided. Fluctuations i the numbers of both species were observed.

13.2. *Special* [*Systematic*] *Zoology*

13.2 (410). EMDEN, F. I. VAN. **Larvae of Britis beetles. III. Keys to the families.** *Ent. mon. Mag.* 7 1942 (206–26, 253–64, 265–72). [Imperial Institut of Entomology.]

13.2 (7). BLACKMAN, M. W. **Revision of the bar beetles belonging to the genus *Pseudohylesinus* Swaine** *Misc. Publ. U.S. Dep. Agric.* No. 461, 1942. pp. 3 [Bureau of Entomology and Plant Quarantine U.S.D.A.]

Includes a key to the species of *Pseudohylesinu* Swaine and descriptions of 16 species, of which 7 ar new. Lists showing the host plants and distributio of the genus in North America are appended.

13.2 (73) : 12.26–8. HOFFMANN, C. H. **Annotated lis of Elm insects in the United States.** *Misc. Publ. U.S Dep. Agric.* No. 466, 1942. pp. 20. [Bureau of Entomology and Plant Quarantine, U.S.D.A.]

13.2 (79.2–3). THATCHER, T. O. **A new genus o Scolytidae (Coleoptera) from Utah and Nevada.** *Proc Utah Acad. Sci.* 17, 1940 (89–91). [U.S. National Par Service.] N.H.M.

Descriptions are given of the adults of *Xylocomesu cercocarpus*, gen. et sp. n. (the genotype), from *Cerco carpus ledifolius* at 8,000 ft. elevation in Nevada, and o *X. knowltoni*, sp. n. from *Populus tremuloides aurea* i Utah. Keys to the species and to *Xylocomesus* an related genera of Scolytinae are included.

2. SILVICULTURE

2 : 12.26–8 : 3 : 34.24 (68.4). WIMBUSH, S. H. **A comparison of Wattle growing in Natal and Kenya. Pt. I— Notes on South African practice.** *E. Afr. agric. J.* 6, 1940–41 (121–6).

The two species of Wattle under cultivation in South Africa are *Acacia mollissima* Willd. (*A. decurrens* Willd. var. *mollis* Lindl.) and *A. decurrens* Willd. Information is given on silvicultural policy and practice, grading and marketing.

2 : 12.25 : 60.31.2 : 12.19 : 23.1 : 43 : 22 : 66 : 32.1 : 24 : 44.3 : 45.3. CHAPMAN, H. H. **Management of Loblolly Pine in the Pine-hardwood region in Arkansas and in Louisiana west of the Mississippi River.** *Bull. Yale Univ. Sch. For.* No. 49, 1942. pp. 150 + plates.

A manual of the silviculture, management, and protection of Loblolly Pine in this region, with detailed bibliography and a summary of essential management rules.

21. SILVICULTURAL CHARACTERS OF TREE SPECIES

21 (410) : 23.24 : 31.0. **Home-grown timber trees: their characteristics, cultivation and uses.** Timber Development Association Ltd., 75, Cannon Street, Londo E.C.4. 1942. pp. 8.

A tabular statement giving brief particulars for tree commonly grown in Great Britain. The statement i designed to afford a certain measure of guidance t persons contemplating tree planting.

21.3. *Soil Requirements*

21.32 : 12.25 : 12.11.23 : 42.5. LUDBROOK, W. V. **Th effect of various concentrations of boron on the growth o Pine seedlings in water culture.** *J. Aust. Inst. agric. Sc* 8, 1942 (112–4). E.M.B.

Growth rate of *Pinus radiata* increased with th concentration of boron in the nutrient solution up t 0·05 p.p.m. of added boron. Seedlings in solution containing from 0·005 to 0·01 p.p.m. of added boro showed deficiency symptoms of degrees varying wit the concentration. Toxicity symptoms were show with 10 or more p.p.m. of added boron but not wit 5 p.p.m. or less. Needles from boron deficient plant contained less starch than those receiving adequat boron but showed no difference in chlorophyll conten

21.6. *Behaviour in the Stand*

21.6 : 12.25 : 12.11.23 : 12.11.3. Cook, D. B. **Characteristics of Dunkeld Larch and its parent species.** *J. For.* 40, 1942 (884–5). [New York State Conservation Dept.]

Seedlings (2–0 stock) of European Larch, Japanese Larch and Dunkeld Larch (*Larix eurolepis*—a hybrid between European and Japanese Larch) were planted on comparable sites at 6 × 6-ft. spacing. Five years after planting percentages of survival are shown as 86, 90 and 93, and average height growth as 7·56, 9·90 and 10·98 ft. respectively. The Dunkeld Larch resembles its pollen parent (European) in form and straightness and its seed parent (Japanese) in twig colour and rapidity of growth.

21.63.2 : 12.25 : 24.36 : 56.02. Wadsworth, F. H. **Value of small-crowned Ponderosa Pines in reserve stands in the southwest.** *J. For.* 40, 1942 (767–71) [Southwestern Forest & Range Exp. Sta.]

From a study made in northern Arizona it is concluded that the rate of growth of Ponderosa Pine is much more closely related to environment than to crown size or age. To obtain highest value increment in the management of cut-over stands consideration should be given to the future growth of the small-crowned subordinate trees as well as to that of dominants, as long as the bole of the subordinate is sound and of good form and the crown shows no signs of physiological decline. Such trees, when released, may be expected to grow at a rate of 2 in. per decade for at least 30 years.

21.64 : 23.1 : 12.25 : 12.19.23. McCulloch, W. F. **The role of bracken fern in Douglas-Fir regeneration.** *Ecology* 23, 1942 (484–5). [Oregon State Board of Forestry.]

Six $\frac{1}{76}$-acre plots were laid out in 1938 in a typical fern-patch area in the drier inland type of the Douglas Fir (*Pseudotsuga taxifolia*) region in western Oregon. The region chosen had been cut over in 1932, slash-burned once, and since then protected from fire. On three plots the bracken fern was completely cut off each year for four years and the trees freed from the competition of other vegetation, while on three check plots the bracken cover was left undisturbed. In every instance more young trees were present in 1942 on the sites protected by bracken fern than on the cleared plots. On the latter many seeds were observed to germinate in successive years but these failed to survive, presumably owing to lack of protection. It therefore seems that the presence of bracken fern in the drier Douglas Fir areas is not detrimental to the regeneration of this species.

22. SILVICULTURAL SYSTEMS. FORMS OF STAND

22.12.2 : 96.1. Timofeev, V. P. **Gradual fellings in Pine stands.** *Lesnoe Khozyaystvo, Moscow* 1940 (9), (14–21). [R.]

The author discusses the relative advantages of clear-felling and gradual felling in Pine stands with particular reference to commercial forests that are also used for protection purposes. He suggests that there is scope for compromise arrangements, which may, for instance, facilitate the extraction of timber without unduly breaking the forest cover. Thus a felling unit 100 m. wide may be divided into five 20-m. wide strips and felled in three operations at intervals of not more than five years, removing the following percentages of the growing stock from the strips:—

	First operation	*Second operation*	*Third operation*
Central strip . .	75–80	20–25	0
Two adjoining strips . .	30–35	30–40	30–35
Two outer strips . .	20	40	40

22.14 : 12.25 : 24 : 44.3. Spaulding, P., Westveld, M., Hansbrough, J. R. **Balsam Fir—use it, don't lose it.** *Tech. Note Ntheast. For. Exp. Sta.* No. 49, 1942. pp. 2.

The proportion of Balsam Fir in the mixed Spruce/Fir forests of the northeastern United States is increasing following cutting; the relative value of this species has also increased. However, it is subject to several types of decay and under present cutting practices there is sufficient time between cuts to permit many trees of this species to reach maturity and be windthrown or become highly defective. The authors suggest that loss from rot and windfall can be reduced, the merchantable volume of Balsam Fir greatly increased, and average yields per acre from Spruce/Fir lands possibly doubled, by partial cutting of stands on a cutting cycle of not more than 20 years, removing Balsam Fir at 50 to 70 years and Spruce on a selection basis, and by maintaining the stands in thrifty condition through cultural treatment.

22.14 : 22.83.2 : 24.36. Recknagel, A. B., and Westveld, M. **Results of second remeasurement of Adirondack cutting plots.** *J. For.* 40, 1942 (837–40). [Cornell University.]

In 1930, five 28-acre sample plots were established in mixed Spruce/hardwood forest (Red Spruce/Yellow Birch and Red Spruce Sugar Maple Beech types) of the Adirondacks. On three of these plots the Spruce and Fir were cut at different intensities, on the fourth plot the defective and poorly shaped hardwoods were girdled and the fifth plot was used as a check. The purpose of the experiment was to determine the practicability of reducing the interval between successive cuts of pulpwood from about 60 years (clear cutting) to about 25–30 years (partial cutting), thereby using practically the entire pulpwood growth including many short-lived Balsam Firs; also to show the development taking place in the stand following cutting. From remeasurements of the plots made in the fall of 1940 it is concluded that for mixed Spruce/hardwood stands of this type:—(1) no net increase in merchantable volume of Spruce and Fir will probably occur for 9–10 years after cutting; (2) the major softwood contribution to the stand after cutting is 1- to 4-in. saplings; (3) advance conifer reproduction is normally plentiful prior to cutting but may be seriously and needlessly reduced during logging; (4) hardwoods left standing are likely to impede the development of understorey softwoods for many years unless girdled or removed; (5) while in the original stands Spruce is dominant over the Fir, in young growth the situation is reversed.

23. FORMATION OF STANDS

23.1. *Natural Regeneration*

23.1 : 12.25 : 46 : 32. Popov, V. V. **Natural regeneration following concentrated fellings.** *Lesnoe Khozyaystvo, Moscow* 1940 (8) (27–31). [R.]

Observations in several Pine forest types in the Altai indicate that tractor logging in summer damages or destroys regeneration on 10–20 per cent. of the felling area and may also in places decrease somewhat the air capacity of the soil, but that such damage is only temporary and not serious provided sufficient numbers of suitable seed trees have been left to restock the area.

23.1 : 12.26–8 : 24. FISCHER, F. Einige Ergebnisse von Studien über Nachzucht und Erziehung der Eiche im bernischen Bucheggberg. **[Some results of studies on the regeneration and rearing of Oak in the Bernese Bucheggberg.]** *Schweiz. Z. Forstw.* 93, 1942 (255–6). [G.]

23.13 (410). MARRIOTT, C. **Regeneration of woods and felled areas.** *Quart. J. For.* 37, 1943 (17–24).

Note on basic principles for securing natural regeneration under British conditions.

23.2. *Artificial Regeneration*

23.23. Sowings

23.23.1. *Seed Procurement, Treatment, and Testing*

23.23.11 : 12.19 (47.2–6). DANILOV, D. N. **The geographical distribution of seed yields of Spruce.** *Lesnoe Khozyaystvo, Moscow* 1940 (8), (44–8). [R.]

Includes maps showing for each of the years 1934–9 the location of good-, medium-, and poor-yield regions in the U.S.S.R., all Soviet species of Spruce being lumped together. Regions of more or less uniform yield proved to be very large in extent, each embracing several hundred thousands or even millions of sq. km.

23.23.11 : 12.25 : 52.2. REINEKE, L. H. **Fruiting of 10-year-old conifers.** *Tech. Note Ntheast. For. Exp. Sta.* No. 47, 1941. pp. 3.

Data on cone production in relation to tree height for young White Spruce, Red Pine and Eastern White Pine grown in plantations.

23.23.11 : 12.26–8 PYATNITSKIY, S. S. **The fruiting of *Fraxinus excelsior* in a hill forest.** *Lesnoe Khozyaystvo, Moscow* 1940 (8), (36–9). [R.]

An account of observations in a dense 110-year-old stand in the Kharkov region composed chiefly of Oak and Ash in the ratio of 7 to 3. The number of Ash seeds shed amounted to approximately 1·5 million per ha., some 32 per cent. of the seed being empty. Approximately one-half of the seed was shed on snow and wintered in it.

23.23.15 : 12.26–8 : 34.26. SHARPE, R. H., and MERRILL, S. **Effect of stratification and time of planting on germination of Tung seed.** *Proc. Amer. Soc. hort. Sci.* 40, 1942 (286–91). [U.S. Department of Agriculture.] E.M.B.

23.23.19. TAYLOR, C. A. **Cutting tests on small seeds.** *J. For.* 40, 1942 (809).

The author suggests using a strip of cellophane Scotch tape stretched on the cutting board with sticky side up, the seeds to be dissected being sprinkled or placed in a row on the tape.

23.23.19 : 12.26–8 (729.5). COOK, M. T. **Germination failures of the Magnolia in Puerto Rico.** *J. Agric. Univ. Puerto Rico* 25 (4), 1941 (51–3 + fig.) [Agric. Exp. Sta., Rio Piedras, P.R.] Biol. Abs. 16 (18950).

Magnolia portoricensis and *M. splendens*, once abundant in Puerto Rico, are now rapidly disappearing. The seeds, which fail to germinate and are usually immature, are surrounded by masses of a white fungu mycelium. Many seeds were found not to hav developed embryo sacs. The pollen appeared to b normal.

23.23.3 : 12.26–8 (47.6) : 23.23.15. CHISTYAKOV, A. F **Summer and autumn sowings in nurseries.** *Lesno Khozyaystvo, Moscow* 1940 (9), (36–43). [R.]

An account of investigations in a dry zone of th Kuybishev region between the forest steppe and th open steppe with the seed of woody plants characterize by a long period of dormancy, including *Fraxinu excelsior*, *Acer tataricum*, *Tilia cordata*, *Malus silvestri* and *Sambucus racemosa*. Whereas such seed require stratification when sown in spring, it was found that can be sown 'dry', i.e. without preparation, in summe or early autumn, in which case it gives satisfactor germination in early spring. Alternatively, the sowin may be carried out late in autumn following stratifica tion in moist sand or peat at 3–10° C. *Fraxinu excelsior* seed requires such stratification for 2½– months, or it can be sown 'dry' 2½–3 months before th soil becomes frozen, and in this case it is preferable t cover the seedbeds with a 6- to 8-cm. thick layer c straw to protect them from desiccation and weed With *Acer tataricum* seed slightly better results ar obtained with late autumn sowing following 2–2½ month stratification than with sowing in early autumn (2–2 months before the soil becomes frozen) withou stratification. *Tilia cordata* seed collected in the pre ceding year may be sown untreated in August or, afte 3–4 months stratification, in October; both methods ar satisfactory. *Malus silvestris* seed can be successfull sown 'dry' in August or the first half of September; fo later sowings, at the end of October, 1–1½ months c stratification are essential. *Sambucus racemosa* see may be sown 'dry' 1–1½ months before the beginnin of the frosts; if sown later it should be stratified for th same length of time.

23.24. Formation of Stands by Planting

23.24 : 12.26–8 : 11.33 : 23.22.1. BARGER, G. L., an AIKMAN, J. M. **Response of Black Locust seedlings t variations in aspect of slope and site preparation.** *Abst* in *Bull. ecol. Soc. Amer.* 23, 1942 (72). [Iowa Agr cultural Exp. Sta.] I.F.B.

Experiments were carried out on steep eroded slope of the Lindley loam soil type in southern Iowa. Of th aspects of slope investigated, the south slope afforde the most favourable growth conditions for 1–0 Blac Locust with the east and west slopes ranking in orde

Evidence from field measurements during the season of 1940, 1941 and 1942, indicated that marked varia tions in rate and habit of growth of transplanted Blac Locust seedlings can be induced by modifications in sit preparation independent of weed control. At the clos of the first season, 1–0 Black Locust planted in un ploughed contour strips, kept free from weed compet tion by scalping for a distance of 3 ft. on each side o the seedling row, had made an average height growth o 3·2 ft., an average total branch growth of 5·5 ft., and a average basal diameter growth of 0·54 in. compared wit 4·1 ft., 14·1 ft., and 0·71 in. for the same measurement of comparable transplants grown on ploughed contou strips 6 ft. wide with the same type of weed control.

23.24 : 12.26–8 : 23.21 : 23.23.1 : 23.26. TILLOTSON C. R. **Growing and planting hardwood seedlings on th**

farm. *Fmrs.' Bull. U.S. Dep. Agric.* No. 1123, (revised ed.) 1941. pp. 28. [U.S. Forest Service.]

Advice to the farmer on the choice of trees for farm sites, the method and time of planting or sowing, the spacing of trees in plantations, seed collection and storage, and other practical matters.

23.24 (42.1–8) : 23.21. GARDINER, R. **Replanting Cranborne Chase.** *Quart. J. For.* 37, 1943 (28–35).

Note on planting operations in an area in Dorset covered largely with derelict woods and scrub. Recently part of the work was carried out with the aid of schoolboys from land service camps.

23.24 (77.5) : 12.25 : 56 : 57. MORRIS, W. M. **Forest plantations of Wisconsin.** *Bull. Wis. Dep. Agric.* No. 232, 1942. pp. 62. [Division of Land Economic Inventory and Land Use.]

A general survey of forest plantations in Wisconsin with detailed descriptions of 50 areas, including information on the location and size of the plots studied, the species of tree, date of planting, type of spacing and average rate of growth.

23.24.1. *Planting Material*

23.24.1 : 07.7. ROBBINS, P. W. **A grading and counting machine for forest nursery seedlings.** *J. For.* 40, 1942 (809–11).

Illustrated description of a grading machine and an electric tying machine by which 1,540,000 seedlings were graded and tied in bunches of 50 trees each during 15 nine-hour work days. The crew used for lifting and transporting seedlings to the machine, grading, tying and supervision was equivalent to 12½ men and averaged 8,200 trees per man-day, lifted, graded and tied ready for packing.

23.24.1 : 12.25. HEIMBURGER, C. **Preparation of conifer nursery stock for long-distance shipment.** *Silvic. Leafl. Dom. For. Serv.* No. 10, 1942. pp. 2.

Description of method used for preparing and packing young grafted *Pinus holfordiana* for shipment from England to Canada.

23.24.1 : 23.21 : 21.64. OSTROM, C. E., and FERREE, M. J. **Species and sizes of stock for planting in northwestern Pennsylvania.** *Tech. Note Allegh. For. Exp. Sta.* No. 37, 1942. p. [1].

Data from test plantations showed that large (graded) planting stock (Red Pine, Yellow Poplar and Black Cherry) gave better survival and growth for the first 5 years after planting than did small stock, and was particularly effective on poor planting sites and where frost damage occurred. Black Locust showed good results under difficult planting conditions.

23.26. Plant Rearing. Nursery Practice

23.26 : 12.26–8. LOOMIS, H. F. **Methods of splitting *Hevea* seedlings.** *J. agric. Res.* 65, 1942 (97–124). [Bureau of Plant Industry, U.S.D.A.] O.R.E.

23.26.3 : 23.27. COPLEN, M. G. **Mechanics of moving big trees.** *Amer. Nurseryman* 76 (9), 1942 (9–11).

Recommendations for the transplanting of well-established trees. Such trees can be moved with a reasonable prospect of success provided attention is paid to the choice of tree to be transplanted, the methods of removal, and the preparation of the new site.

23.27. Arboriculture

23.27 : 11.47.1 : 01.4. CHADWICK, L. C. **Fertilization of ornamental trees, shrubs, and evergreens.** *Bull. Ohio agric. Exp. Sta.* No. 620, 1941. pp. 29.

23.3. *Afforestation*

23.3 (922) : 12.26–8 : 97.1. MIJERS, W. N. Herbebossching op Madoera. [**Reforestation in Madura.**] *Tectona* 34, 1941 (909–39). [Du.]

Although information is not available before 1878, it is known that forest comprised some 70 thousand ha. or 13 per cent. of the area of Madura at that time, but it disappeared at the rate of 2 thousand ha. per year so that by 1910 only a scattered area of 6 thousand ha. of Teak forest remained, and there has been further depredation since. A survey was made in 1936, and a scheme of afforestation was presented to the Governor of East Java in 1939. It concerns a total area of 20,590 ha., so selected that the greatest possible amount of river control and soil conservation may be effected. It has been found, for example in the Robatal region, that terracing in certain cases has not only been insufficient to prevent erosion but has actually promoted it. The scheme is outlined as it concerns (*a*) the lime soil terrains, and (*b*) the marl soil lands with their agriculture and different forms of industry. Rapid purchase of the necessary lands is contemplated, to be made if possible within five years, although the whole scheme is calculated to take twenty years to carry out. The rate of planting is planned as 300 ha. for the 1st year, 400 for the 2nd, 500 for the 3rd, 650 for the 4th, 800 for the 5th, 900 for the 6th, and from then onwards, 1,000 ha. per year. The species to be planted are listed, the names being mainly in the vernacular. For the Lomang dune area a native tree called Tjemara is indicated; for most of the lime soils Teak can be used, but the marl soils present more difficulty. Only a small part of them are suitable for Teak-growing; other plants suggested include *Swietenia macrophylla*, *Acacia auriculiformis*, *Eucalyptus* spp. and a *Eugenia* sp. which can thrive on very poor, denuded soils.

The author lists and discusses various objections to the scheme, which has not been accepted by the Government. It has been conceded, however, that action is necessary, so that in the meantime forestry propaganda is to be set on foot among the population, and the existing free Government lands are to be afforested through communal action, while the Forest Experiment Station is to provide advisory help and seed. (In this connexion a legume from Persia, not specified, is mentioned, which is said to provide a tree practically all of which is useful for man and beast.) Four 10-ha. trials are to be carried out, with special reference to the planting of exotics.

The author notes that afforestation of the existing Government lands affords no remedy for the central part of Madura including the Robatal complex, which is in most urgent need of afforestation. G. M. R.

23.6. *Care of Regeneration in the Initial Stage of Establishment*

23.61 : 24.31. OSTROM, C. E. **Eliminating hardwood stump sprouts.** *Tech. Note Allegh. For. Exp. Sta.* No. 32, 1941. p. [1].

As a result of experiments with Black Cherry, carried out at Kane Experimental Forest in northwestern Pennsylvania, it was concluded that breaking the sprouts from hardwood stumps in early summer (just

after the period of most rapid growth) for two or more consecutive years is cheaper and more effective than girdling or peeling in eliminating undesirable sprout growth.

24. TENDING OF STANDS AND TREES

24.3. *Opening of the Canopy. Release and Improvement Fellings*

24.3 : 12.25 : 22.14. PEARSON, G. A. **Improvement selection cutting in Ponderosa Pine.**—With comments. *J. For.* 40, 1942 (753–66). [Southwestern Forest & Range Exp. Sta.]

Improvement selection aims at co-ordinating silvicultural and economic objectives so as to realize maximum increment and maximum values while building up a growing stock that can make full use of the productive capacity of the site. In general, merchantable trees that have attained the peak of value increment are harvested; those which still have high potentialities are reserved as growing stock; and minus-value trees are eliminated in the cheapest way possible.

In the cutting operation described, 52·6 per cent. of the volume of the original stand (17,865 bd. ft. per acre) was removed. Cutting included primarily large, mature trees; overmature, mistletoe infected, and other declining trees; wolf trees and others of poor form where dominating smaller trees of good form. Those left included relatively small trees of all age and vigour classes if physiologically sound, of good bole, and in position to respond to release. Poison was applied to large trees unmerchantable because of poor form; to unmerchantable, mistletoe-infected trees or poles; and to extremely limby poles that could not be pruned economically. A careful study is to be made of the development of the residual stand for guidance to future cutting practice.

Comment on this article by a number of writers is concerned mainly with a criticism of the improvement selection cutting in comparison with the maturity selection system as used in the northwestern states. In reply the author discusses in some detail the more important factors in the management of Ponderosa Pine in the southwest that favour improvement selection.

24.3 : 12.26–8 : 44.3. CAMPBELL, W. A., and SPAULDING, P. **Stand improvement of northern hardwoods in relation to diseases in the Northeast.** *Occ. Pap. Allegh. For. Exp. Sta.* No. 5, 1942. pp. 25 + plates.

A practical guide to felling practices in hardwood stands affected by cankers and heartrots.

24.31. **Science for the farmer: Fifty-third annual report of the Pennsylvania Agricultural Experiments Station for the fiscal year ended June 30, 1940.** *Bull. Pa. agric. Exp. Sta.* No. 399, 1940. pp. 76. A.P.B.

The following results were obtained from tests to determine the effectiveness of various materials in the killing of undesirable 'weed' trees.

Materials applied	*Killed per cent.*	*Partially killed per cent.*	*Alive per cent.*
Sodium arsenite solution	100	–	–
Kendall fuel oil	38	5	57
Michigan fuel oil	17	3	80
Kerosene	61	11	28
Rock salt	73	4	23
Salt with no grubbing or frilling of stem.	82	18	–

The sodium arsenite solution (2 lb. per gal. of water) was applied by sprayer, kerosene and fuel oils were poured around the root collar, the former at about 2 pints to a small sized tree; the salt was heaped about the root collar. In all cases except that indicated the stems were frilled or slashed at the root collar in order to secure better penetration.

24.31 : 12.26–8. STAPLETON, C. C. **[On the killing of trees.]** *Sylva* No. 23, 1942–43 (14, 17).

The best method of those tested for killing rootstocks of Eucalypts and thus preventing the stumps from coppicing was to expose a face of cambium round the periphery of the stumps and apply arsenic pentoxide, 1 lb. to 2 gal. of hot water, towards the end of the summer. Paraffin applied to the bark just below the soil surface is effective in killing certain species of *Acacia* but may take a year to be fully effective.

24.36 : 22.83.2 : 12.25. ROBERTSON, W. M. **Effect of mature Yellow Birch upon Spruce and Fir understory.** *Silvic. Leafl. Dom. For. Serv.* No. 13, 1942. pp. 2.

Data from two sample plots in mixedwood type (mainly Yellow and White Birch overstorey and Spruce/Balsam Fir understorey), from which conifers down to 1 in. d.b.h. were removed and from one of which the Yellow Birch was clear cut, showed that the crown density of 65 mature Yellow Birch per acre had practically no retarding effect upon the number of Spruce and Fir entering the stand, while the removal of the Yellow Birch stimulated the growth of Fir about 100 per cent. and that of Spruce about 15 per cent.

24.36 : 56 : 12.25. ABEL, G. W., and RECKNAGEL, A. B. **Ten-year growth on girdling plots in the Adirondacks.** *J. For.* 40, 1942 (966). [Cornell University.]

On an area of the softwood-flat type that had been heavily logged for Spruce and Balsam Fir in 1896, a dense growth of Spruce and Fir saplings was established under a canopy of hardwoods (Popple, Soft Maple and Yellow Birch). The latter were girdled on selected plots in 1932, and measurements made ten years later on these and on comparable untreated plots showed that girdling the hardwoods improved the growth of Spruce and that the growth of Balsam Fir was more rapid than that of Spruce on both treated and untreated plots.

24.36 : 56 : 21.64 : 12.26–8. DOWNS, A. A. **Early responses to weedings in some eastern mountain hardwoods.** *J. For.* 40, 1942 (865–72). [Appalachian Forest Exp. Sta.]

From repeated measurements over a four-year period it was found that weeding was generally beneficial to the five hardwoods studied—Sugar Maple (*Acer saccharum*), White Oak (*Quercus alba*), Yellow Poplar (*Liriodendron tulipifera*), Cucumber tree (*Magnolia acuminata*) and Eastern Red Oak (*Quercus borealis maxima*),—as it stimulated diameter and height growth, particularly in the lower crown classes, and reduced mortality. Response to weeding differed between species, increased with lower crown class and with better vigour. Thus within a species, crown class and vigour may be used as criteria to determine which trees will respond more favourably to release. Light treatment was nearly as effective as heavy treatment. The crown classes that showed good response to weeding, the qualifications of suitable crop trees, and the amount of release effective at least expense are discussed in detail. *From author's summary.*

24.4. *Shelterbelts. Windbreaks*

24.4 : 23.21 : 12.26–8 : 12.25 : 24 : 23.24.3. LEONE, G. Importanza dei fragiventi nella produzione agricola. [**Importance of windbreaks in farming.**] *Italia Agric.* 77 (3), 1940 (161–9). Biol. Abs. 16 (18959).

To be good windbreaks, plants must have strong stems and evergreen foliage, make rapid growth, and have a limited root system. Species of *Eucalyptus* and *Cupressus* (*C. arizonica* and *C. macrocarpa*) are satisfactory. In certain regions, *Tamarix articulata*, *Casuarina tenuissima*, *Atriplex halimus* and *A. lentiformis* also are valuable. During early growth these plants must be cultivated and handled as carefully as the plants they are to protect. The planting distance varies with the species used, and should not be less than 2 m. The trees should be clipped occasionally to stimulate more compact crowns and dense foliage growth.

24.5. *Pruning*

24.51 : 12.25 : 76. BULL, H. **How much profit in pruning old-field Loblolly Pine?** *Sth. Lumberm.* 165 (2081), 1942 (229–32). [Southern Forest Exp. Sta.]

Estimates are made of the costs, returns and net profits likely to result from the pruning of old-field Loblolly Pine (*Pinus taeda*) to three different heights on trees of various diameters when pruned, but all harvested when 16 in. d.b.h.

24.51 : 56 : 21.62. SOUTH AUSTRALIA. **Woods and Forests Department. Annual report for the year ended 30th June, 1941.** Govt. Printer, Adelaide. 1942. pp. 12.

Intensive studies on the pruning of *Pinus radiata* indicate that severe pruning at an early age should be avoided as it stimulates the growth of epicormis branches and causes decrease in increment. The stage at which pruning may safely be started appears to depend on the establishment of forest canopy. Results obtained suggest that the pruning of selected good trees only may result in loss of growth by pruned trees and favour the unpruned stems (p. 9).

3. FOREST UTILIZATION. FOREST TECHNOLOGY

3 : 02.1. TIEMANN, H. D. **Wood technology.** Pitman Publishing Corporation, New York and Chicago. 1942. pp. 316.

Most of us are familiar with the dull, impersonal lecture that appears to come straight out of a text-book. Mr. Tiemann has achieved the exact converse—a text-book that reads like a good lecture, with his individual point of view and personal touches showing clearly through the print. The rather conversational style, with its frequent rhetorical questions, and the frankly teleological outlook may not appeal to every reader, but the general effect is definitely anti-soporific. One of the great merits of the book is that it manages to cover the whole field of wood technology in a mere three hundred pages without being superficial. On the contrary, the author has the knack of putting his finger at once on the scientific facts and conceptions that explain the numerous and otherwise perplexing practical problems associated with the use of wood.

The first three chapters so to speak paint the background and include the origin and characteristics of different forms of plant life and a brief sketch of plant physiology. The next two chapters describe the anatomy of wood, starting with general characters and functions in the living tree and leading to the more detailed anatomy that is of use for identifying timbers with a lens. There follows an account of the physico-chemical nature of the cell wall, which is short and easily read, but at the same time explicit and up to date; it provides an admirable and necessary background for the rest of the book and leads very naturally to the immediately succeeding chapters on the chemical utilization of cellulosic fibres and synthetic substitutes and on pulp and paper obtained from wood.

A relatively large section of the book—some eighty pages—is devoted to the drying of timber and all the attendant practical problems. This, of course, is the author's own special subject and he can be relied on to do justice to it. It is important for two reasons, firstly because it crops up in so many everyday problems of wood utilization, and secondly because it bears closely on the predicted competition between natural wood and the new synthetic products such as plastics. Wood has many valuable properties, but it also has one that is far from desirable—hygroscopicity—and a scientific appreciation of the relationships between wood and moisture is a matter of very considerable practical significance. In the chapter on shrinkage and swelling, the author poses the following questions:—1. Why do barrel hoops loosen and the staves ultimately fall apart? or why do nails loosen in boxes exposed to the weather? or why do axe handles, ladder rungs and wheel spokes loosen after a wetting? 2. Will a round hole bored in a wet plank get larger or smaller when the plank dries? How about a knot hole? 3. In a mitred joint, as in the corner of a picture frame, what will happen if the wood swells? 4. Why does the heartwood of many species, for example Oak, apparently shrink much more than the sapwood when dried from the green condition? 5. Why does wood shrink so little longitudinally? The author warns the reader that, if he can answer these questions correctly, there is no need to read the rest of the chapter; one might add that if he cannot, the book is worth buying for this chapter alone.

Further chapters describe collapse, methods of reducing shrinkage, methods of drying, the density of wood substance and the absorbtion of liquids, and biological destructive agencies. No attempt is made to give technical details, such, for example, as the different types of kiln or of timber-testing machines; the aim seems rather to give a clear picture of the fundamental principles as the best means of enabling the practical man to become more practical. For example, the discussion of kiln drying is largely devoted to showing how to sample for moisture contents and the stresses developed when drying and how to use the data so collected as a basis for working out a suitable schedule. Wood preservation receives only a very brief treatment. The book concludes with a key to American woods that is based primarily on macroscopic characters but also includes supplementary microscopic details. The numerous illustrations, both line drawings and photographs, are well chosen and reproduced, and some new interesting data are provided in the form of tables and graphs. L. CHALK.

31. PROPERTIES AND ANATOMY OF WOOD. WOOD RESEARCH

31 : 01.4 : 31.27. YLINEN, A. Über den Einfluss der Probekörpergrösse auf die Biegefestigkeit des Holzes. **[On the influence of the size of the test specimen on the bending strength of wood.]** *Holz* 5, 1942 (299–305). [G.g.] P.R.

Methods are proposed for determining the magnitude of this influence, which is due to the fact that wood is not a homogenous material.

31.0. *General Information on Woods*

31.0. *Timber Leaflet* Nos. 75–8. Timber Development Association, Ltd., 75, Cannon Street, London, E.C.4. 1942–43.

Additions to the series noted in *For. Abstr.* 4 (30).

31.0 : 12.26–8. **The properties of Australian timbers: Yellow Walnut (*Beilschmiedia bancroftii*, C. T. White).** *Mon. News Lett. Div. For. Prod. Aust.* No. 127, 1942 (5).

31.0 : 12.26–8. BETTS, H. S. **American woods: Hickory.** U.S.D.A. Forest Service, Washington, D.C. 1942. pp. 11 + maps & gph.

True Hickories of commercial importance include Shagbark Hickory (*Hicoria ovata*), Shellbark Hickory (*H. laciniosa*), Pignut Hickory (*H. glabra*), and Mockernut Hickory (*H. alba*). This pamphlet presents data for these species on nomenclature, distribution and growth, supply, production, wood properties, principal uses, and quantities used in different classes of products.

31.0 : 12.26–8. BETTS, H. S. **American woods: Magnolia.** U.S. Forest Service, Washington, D.C. 1942. pp. 8 + map & gph.

Most of the Magnolia lumber on the American market comes from two southern species—Southern Magnolia (*Magnolia grandiflora*) and Sweetbay (*M. virginiana*). This pamphlet presents data for these species on nomenclature, distribution and growth, supply, production, wood properties, principal uses, and quantities used in the manufacture of wooden products.

31.0 : 12.26–8 (68.9). NORTHERN RHODESIA. **Native timber.** Northern Rhodesia Chamber of Mines. 1942. pp. 21.

The purpose of this publication is to acquaint timber-users in Northern Rhodesia with native timbers (mainly *Isoberlinia* spp. and *Brachystegia* spp.) the use of which will have to be developed as imports are reduced, and to suggest how best to handle and grade these timbers. Appendices include brief notes on (*a*) the uses, properties and characteristics of various native timbers, (*b*) common wood borers, and (*c*) recommendations to timbermen and underground officials on the use of native timber.

31.0 : 12.26–8 : 55. BROMLEY, W. S. **Sapwood in Sugar-Maple trees.** *Pap. Mich. Acad. Sci. 1941* 27, 1942 (163–8). [University of Michigan.] L.S.

Data on some factors seeming to influence the width of sapwood in Sugar Maple trees, based on an examination of two tracts of virgin northern hardwood timber in Michigan, one on a good, and one on a poor site. There was generally greater width of sapwood on the good site, while in both sites the proportion of sapwood to heartwood was greatest in the younger trees. In the older and larger trees, however, there was a greater total amount of sapwood, which was usually much more free from knots than in the younger trees.

31.0 (68) : 33.36.1 : 31.43 : 13.2 : 33.53–5 : 33.36.3 : 33.17. **Protection of wood on the farm.** *Repr.* from *Fmg. S. Afr.* September, 1941. pp. 2. I.I.E.

This paper includes five sections as follows:—(1) By P. J. A. Loseby on methods of wood preservation that are available to the farmer; (2) by G. J. Broekhuysen on the control of termites in wood, the four species of greatest importance in the Union of South Africa being *Termes natalensis* Hav., *T. lætericius* Hav., *T. badius* Hav. and *Bellicositermes swaziae* Full.; (3) by F. G. C. Tooke on preventing damage in timber by Lyctids and Bostrychids; (4) by J. J. Voorendyk giving a list of South African indigenous timbers of fairly durable quality which may be used in the round for the construction of roof trusses, gates, fodder racks, etc.; (5) by M. H. Scott on the sawing and seasoning of timber in order to use it to best advantage.

31.1. *Structure. Anatomy. Identification*

31.1. RECORD, S. J. **Keys to American woods.** *Trop. Woods* No. 72, 1942 (19–35).

Keys based on vessel arrangement or pore patterns are presented for three groups of American genera:—(1) ring-porous woods; (2) woods with pores in ulmiform or wavy tangential arrangement; (3) woods with pores in flame-like or dendritic arrangement.

31.1 : 01.4 : 31.8. AUSTRALIA. **Council for Scientific and Industrial Research. Division of Forest Products. Annual report 1941–42.** [Melbourne. 1942?] pp. 15.

In work with Hoop Pine (*Araucaria cunninghamii*) microscopic methods have been found to be the most definite for detecting the presence of compression wood (p. 13).

31.1 : 12.25 : 12.11.23. BOUREAU, E. Les résorptions vasculaires dans la plantule du *Libocedrus decurrens* Torr. et l'explication de l'appareil constructeur des Sphenophyllées. **[Vascular resorption in the seedling of *Libocedrus decurrens* Torr., and the explanation of the structural system of Spenophyllaceae.]** *C.R. Acad. Sci., Paris* 212, 1941 (450–2). [F.] L.S.

The vascular system of *Sphenophyllum*, as observed in fossil specimens, seems to have followed a process of differentiation analogous with that which takes place in the hypocotyl of *Libocedrus* seedlings, although phyletically the plants are quite distinct. The unusual arrangement of vessels, however, is retained throughout the whole stem of *Sphenophyllum*, whereas in *Libocedrus decurrens* it is found only in the hypocotyl.

31.1 : 12.25 : 12.14.3–4. BANNAN, M. W. **Wood structure of *Thuja occidentalis*.** *Bot. Gaz.* 103, 1941–42 (295–309). [University of Toronto.] O.B.D.

Study of secondary xylem in 230 wood samples of White Cedar (*Thuja occidentalis* L.) taken from trees within a 75-mile radius of Toronto revealed that there were often very marked variations in the structure of the xylem, even in the same piece of wood, although in some cases definite trends were recognizable. The samples examined were from trees of different sizes, from various parts of the tree, and, in the case of roots, from different habitats and depths in the soil. It is obvious that, in view of this variability, care must be exercised in the selection of diagnostic characters for the identification of woods, and combinations of characters

rather than single characters should be used for this purpose. [Cf. *For. Abstr.* 3 (218–9).]

31.1 (54). CHOWDHURY, K. A. **How to identify timbers. Part I. Hints on the identification of Indian timbers.** *Indian For. Leafl.* (*Utilisation*) No. 21, 1942. pp. 5 + plates. [Forest Research Institute, Dehra Dun.]

A brief illustrated description in simple language of features of wood, distinguishable by means of a hand lens, that are of diagnostic value in the field identification of Indian timbers.

31.1 : 12.26–8 : 33.8. CHOWDHURY, K. A. **How to identify timbers. Part II. Timbers for helves and tool handles.** *Indian For. Leafl.* (*Utilisation*) No. 25, 1942. pp. 16. [Forest Research Institute, Dehra Dun.]

Includes a key for the field identification of important Indian timbers used for helves and tool handles, and brief anatomical descriptions of the timbers which include *Dalbergia sissoo*, *Grewia* spp., *Ougeinia dalbergioides*, *Heritiera* spp., *Terminalia tormentosa*, *Acacia arabica*, *Tamarindus indica*, *Parrotia jacquemontiana*, *Diospyros* spp., *Thespesia populnea*, *Kayea floribunda*, *Cynometra polyandra*, *Atlantia* spp., *Olea cuspidata* and *Anogeissus* spp. [Cf. preceding abstract.]

31.1 : 12.26–8. FREY-WYSSLING, A., and AEBERLI, H. Der Anteil von Fasern, Gefässen und Parenchym verschiedener Holzarten in Dreiecksdarstellung. **[The proportion of fibres, vessels and parenchyma in different tree species as represented by means of the 'triangle' diagram.]** *Holz* 5, 1942 (265–8). [G.g.] [Pflanzenphysiologisches Institut der Eidg. Techn. Hochschule, Zürich.] P.R.

From a comparison of the proportion of fibres, vessels, and parenchyma in 40 tree species it appears that the proportion of vessels is similar within a number of botanically related groups, such as the Fagaceae, Betulaceae, and *Populus*.

31.1 : 12.26–8. HUBER, B., HOLDHEIDE, W., and RAACK, K. Zur Frage der Unterscheidbarkeit des Holzes von Stiel- und Traubeneiche. **[On the question of the differentiation of the wood of *Quercus robur* and *Q. sessiliflora*.]** *Holz* 4, 1941 (373–80). [G.] P.R.

Literature data and the writers' own investigations are discussed. Although there does not appear to be an anatomical character by which the wood of the two species can be clearly distinguished, certain characters tend to be more pronounced in the one or the other species, and, in combination, to allow of distinguishing between the two with a fair degree of reliability. Four pairs of features were used:— 1. Ratio of width of pore-zone to width of ring in broad rings, (*a*) less than 25 per cent., (*b*) more than 25 per cent. 2. Number of vessels in pore-zone of well-developed rings, (*a*) 4 or more, (*b*) less than 4. 3. Shape of vessels, (*a*) oval, (*b*) round. 4. 'Flames' of latewood vessels, (*a*) broad and ill-defined, (*b*) narrow and distinct. Of each of the above alternatives, that given under (*a*) is most characteristic of Pedunculate Oak.

31.1 : 12.26–8. R[ECORD], S. J. **The woods of *Daubentonia*.** *Trop. Woods* No. 72, 1942 (15–16).

The woods of *Daubentonia punicea* and *D. texana* are described briefly.

31.1 : 12.26–8. RECORD, S. J. **American timbers of the genera *Dalbergia* and *Machaerium*.** *Trop. Woods* No. 72, 1942 (1–11).

American species of *Dalbergia* best known to commerce are Brazilian Rosewood (*D. nigra*), Amazon Rosewood (*D. spruceana*), Brazilian Kingwood (?*D. cearensis*), Brazilian Tulipwood (?*D. variabilis*), all from Brazil; Cocobola (*D. retusa*) from the Pacific coast of Panama, Costa Rica, and Nicaragua; Honduras Rosewood (*D. stevensonii*) from southern British Honduras; and Guatemala Rosewood (*D. cubilquitzensis*) from eastern Guatemala and Honduras. Brief notes are given on tree habit, the wood characteristics, properties and uses, and the common names of these species are listed. A note is also included on *Machaerium* spp. Several of the larger species are said to produce high quality timber suitable for the same purposes as Rosewood.

31.1 : 12.26–8. TILLSON, A. H., and MULLER, C. H. **Anatomical and taxonomic approaches to subgeneric segregation in American *Quercus*.** *Amer. J. Bot.* 29, 1942 (523–9). [Bureau of Plant Industry, U.S.D.A.] O.B.D.

Examination of the wood anatomy of 104 species of American *Quercus* showed that the anatomical characters of the wood do not constitute a suitable basis for subgeneric division as about 50 per cent. of the White Oak (*Lepidobalanus*) species examined exhibited Red Oak (*Erythrobalanus*) wood characters. These characters are correlated very poorly with evergreen habit and the presence of mucronate tips on the leaves, and are not at all correlated with conventional taxonomic characters of the subgenera. *From authors' summary.* [Cf. *For. Abstr.* 1 (170); 4 (21, 32–3).]

31.1 : 12.26–8 (213). RUNKEL, R. Wesen, Ziele und Aufgaben der Zellwandforschung. Zugleich III. Mitteilung 'Zur Kenntnis der Zellwände tropischer Laubhölzer'. **[Means, aims and problems of cell-wall investigation. Also *Communication* No. III, 'On the cell-walls of tropical hardwoods'.]** *Holz* 5, 1942 (305–9). [G.g.] P.R.

The study of cells involves not only the description of their forms and the characterization of the properties of the matter that composes them, but it also involves the investigation of the relationships that exist between form and matter. The study of the cell walls of lignified plant structures owes its special importance to that of wood as a raw material. The great variety of form and matter encountered in the tropical tree flora offers the possibility of placing wood research on a wider basis.

31.1 : 12.26–8 (921). COCKRELL, R. A. **An anatomical study of eighty Sumatran woods.** *Univ. Mich. Microfilm Publ.* No. 384, 1942 (1–317). [University of Michigan.] Biol. Abs. 16 (22941).

This study includes woods belonging to 29 families and 61 genera, according to Engler's classification. Detailed descriptions are based on samples collected in 1930 and 1932 in the Sultanate of Asahan, east coast of Sumatra, authenticated by herbarium specimens from the identical trees. Supplementary wood samples of many species were obtained from institutional collections. For each species information is given under the following headings: vernacular name, general features of wood, gross structure, minute anatomy, material, uses and references. The non-mechanical physical properties, such as colour, lustre, weight, hardness, grain, texture, odour, and taste are included under the general features of wood. Under the 'gross

structure' (characteristics visible to the unaided eye or a hand-lens of 10× magnification) special attention is given to visibility, colour contrast, distribution, arrangement, and size of the features observed. Under 'minute anatomy', the various wood elements are described as to their arrangement, number, general shape, size and structure. The information on uses, where given, has been obtained mostly from the collector's field notes and from the references. Photomicrographs of the transverse and tangential sections magnified 100 times, and of the transverse section magnified 10 times are provided for each species. The most distinctive anatomical features of diagnostic value for the various genera are listed. The following genera are represented: *Sloetia, Artocarpus, Ficus, Villebrunea, Ochanostachys, Aromadendron, Cananga, Polyalthia, Cinnamomum, Litsea, Pittosporium, Koompassia, Cassia, Tetractomia, Micromelum, Merrillia, Eurycoma, Canarium, Dacryodes, Santiria, Aporosa, Glochidion, Actephila, Bischoffio, Bridelia, Croton, Mallotus, Macaranga, Trigonostemon, Elateriospermum, Endospermum, Homolanthus, Sapium, Buchanania, Mangifera, Camnosperma, Durio, Commersonia, Pterocymbium, Scaphium, Wormia, Dillenia, Saurauia, Eurya, Calophyllum, Flacourtia, Rhodamnia, Decaspermum, Eugenia, Memecylon, Palaquium, Ligustrum, Dyera, Callicarpa, Premna, Vitex, Deplanchea, Urophyllum, Vernonia.*

31.1 : 12.26–8. MUKHERJEE, A. **Identification of fossil wood from the Lalmai Range in Comilla, Bengal.** *Sci. & Cult.* 7, 1942 (572–4). [Calcutta University.] L.S.

Anatomical re-examination of a fossil specimen previously identified as *Dipterocarpoxylon* suggests that the specimen would be more correctly identified as a species of *Glutoxylon.*

31.2. *Physical Properties*

31.2 : 34.26 : 12.26–8. PRÜTZ, J., and GLÜCK, A. Untersuchungen über einzelne physikalische und mechanische Eigenschaften sowie über den Extrakstoffgehalt von Pockölzern. **[Investigations on some physical and mechanical properties and the content in extractable substance of Lignum Vitae timbers.]** *Kolonialforstl. Mitt.* 4, 1941 (161–78). [G.] *Abstr.* in *Holz* 5, 1942 (285). [G.] P.R.

Data on *Bulnesia arborea* timber and six different *Guaiacum* timbers.

31.27. Mechanical Strength

31.27 : 07.7. **A mechanical method for determining the quality of aircraft woods.** Civil Aeronautics Authority, Aircraft Airworthiness Section *Report* No. 18, 1940. pp. 12 + 26 + plate. [Certificate and Inspection Division Release No. 22.]

Description of the machine developed at the Forest Products Laboratory, Madison, for the testing of wood toughness.

31.27 : 12.25 : 31.23 : 31.22.1 : 11.11. THUNELL, B. Die Festigkeitseigenschaften schwedischen Kiefernhölzes. **[The strength properties of Swedish Pine timber.]** *Ing. Vetensk. Akad. Handl.* No. 161, 1941 (1–45). [Sw.] *Abstr.* in *Holz* 5, 1942 (287). [G.] P.R.

A summary of tests, mostly on specimens from central Sweden, on the relationships of tensile strength, compression strength, bending strength, resistance to impact bending, shearing strength, modulus of elasticity, moisture content, density, direction of fibre, and temperature. The most important results were obtained in the impact bending tests. Resistance to impact bending increased almost linearly with density at temperatures between – 60° C. and + 50° C. and moisture contents of 70 per cent. to 10 per cent.; at + 20° C. it was doubled by raising the moisture content from 12 per cent. to 25 per cent., and trebled when the moisture content was raised to 70 per cent.; at – 20° C. it was almost constant between moisture contents of 12 per cent. and 25 per cent. but was twice as great at a moisture content of 70 per cent.; at – 60° C. it was three times as great at 12 per cent. moisture content as at 70 per cent. moisture content; at 12 per cent. moisture content it remained constant between + 50° C. and 0° C., decreased somewhat between 0° C. and – 20° C., and was trebled at – 60° C.; at 25 per cent. moisture content it was halved by lowering the temperature from + 20° C. to – 17° C.; and at 70 per cent. moisture content it decreased by one-third and two-thirds when the temperature was lowered from + 20° C. to – 17° C. and – 60° C., respectively.

31.27 : 12.26–8 : 33.51. Robinie als Grubenholz im Vergleich zu anderen Holzarten. **[Black Locust as a mine timber in comparison with other types of wood.]** *Holz* 5, 1942 (324). [G.] P.R.

Note on tests by the Reichsanstalt für Holzforschung using mining timber about 60 cm. long of an average diameter of 13·5 cm. and an average moisture content of 26 per cent. The following results were obtained:— average modulus of elasticity, 135,000 kg. per sq. cm.; average compressive strength, 383 kg. per sq. cm.; average compression at which distinct warning noises are heard, 291 kg. per sq. cm. The figure obtained for compressive strength compares favourably with corresponding figures for Pine, Spruce, and Oak, and the timber is considered generally suitable for use in mines.

31.27 : 31.23 : 31.22.1. UGRENOVIĆ, A. Untersuchungen über die Abhängigkeit der Spaltfestigkeit von der Spaltebene und vom Feuchtigkeitsgehalt. **[Investigations on the dependence of resistance to cleaving on the cleavage plane and the moisture content.]** *Holz* 5, 1942 (225–30). [G.g.] P.R.

For the species investigated, cleavage strength in the radial plane increased in the order of:—Spruce, Silver Fir, Sweet Chestnut, Scots Pine, Austrian Pine, Hornbeam, English Oak, Elm, Sessile Oak, Beech, and Ash. Except for Scots Pine and English Oak, cleavage strength was greater in the tangential than in the radial plane. Resistance to cleaving tended to increase with density for the various species and within each species. Except for Hornbeam, all species showed the highest resistance to cleaving in the air-dry condition.

31.28. Working Qualities

31.28 : 12.26–8 : 31.22.2 : 31.21.33 : 31.23. DAVIS, E. M. **Machining and related characteristics of southern hardwoods.** *Tech. Bull. U.S. Dep. Agric.* No. 824, 1942. pp. 42 + plates. [Forest Products Laboratory, Madison, Wis.]

Among the important classes of properties that affect the general utility of a given type of wood are its machining properties, which relate to all wood-working operations. In these, as in other classes of properties, different woods vary widely, and a given wood may give different results in the various operations involved. 'Workability' cannot therefore be judged by one

operation, but depends rather upon the summation of them all. In any operation there are several factors, both in the wood itself and in the machine, that affect the results. Some woods machine well under a relatively wide range of conditions, while others are handicapped by the need for exacting techniques. The paper gives the results of planing, shaping, turning, boring, mortizing, sanding, steam-bending, nail-splitting, and screw-splitting tests for 25 hardwood timbers. Data are also included on some of the properties of the woods tested that affect machining, including specific gravity, ring width, straightness of grain, and shrinkage and warping in drying.

31.3. *Chemical Properties*

31.3. Allsopp, A., and Misra, P. **The constitution of the cambium, the new wood and the mature sapwood of the common Ash, the common Elm and the Scotch Pine.** *Repr.* from *Bio-chem. J.* 34, 1940 (1078–84).

The woods of Ash (*Fraxinus elatior*), Elm (*Ulmus sativa*) and Scots Pine (*Pinus sylvestris*) were divided into three fractions:—cambium + differentiating xylem, newly formed wood and mature sapwood. Analyses were made of each fraction. The composition of the cambium was found to be similar to that of other differentiating tissues, especially in the high pectin and relatively low lignin contents. There is some evidence that further slight changes occur in the composition of the wall after vessel differentiation is complete. *From authors' summary.*

31.3. Freudenberg, K., Lautsch, W., and Piazolo, G. **Lignin. XLVIII. The action of potassium in ammonia on the lignin and wood of Spruce and Beech.** *Ber.* No. 74B, 1941 (1879–91). [G.] Chem. Abs. 36 (5144). P.R.

31.3 : 12.26–8. Hurel-py, G. Modifications provoquées sur le bois des arbres par les injections de bichromate de potassium. [**Modifications brought about in the wood of trees by injections of potassium bichromate.**] *C.R. Acad. Sci., Paris* 212, 1941 (452–4). [F.] L.S.

Injection experiments were carried out with ten different woods—*Acer pseudoplatanus*, *Aesculus hippocastanum*, *Betula alba*, *Fraxinus japonica*, *Juglans regia*, *Platanus orientalis*, *Populus fastigiata*, *Populus italica*, *Quercus ilex* and *Tilia* sp., the injections being made at the end of summer. The injected wood appeared to age prematurely, and an increase occurred in the aldehyde substances, except in the case of *Quercus ilex* and *Platanus orientalis* where there was a diminution. There was also a modification of the cell contents, starch being increased, except in the case of *Q. ilex* where the amount remained substantially the same. The tannin content was less than in the controls. The method of potassium bichromate penetration was studied in experiments with Maple and Walnut where the difference between the injected wood and the controls was particularly marked.

31.3 : 12.26–8 : 12.14. McNair, J. B. **Some chemical properties of *Eucalyptus* in relation to their evolutionary status.** *Madroño* 6, 1942 (181–9). K.

31.3 : 12.26–8. Anderson, E., Kaster, R. B., and Seeley, M. G. **Hemicelluloses and pectic materials from Cottonwood, *Populus macdougali*.** *J. biol. Chem.* 144, 1942 (767–72). [University of Arizona, Tucson]. L.S.

The isolated hemicelluloses form a mixture of molecules consisting of a methoxyuronic acid combined with a chain of between approximately 7 and 9 xylan units. These hemicelluloses are smaller than those previously described. Those obtained before chlorination of the wood gave the iodine test for starch, while those obtained after chlorination of the wood did not give this test. After hydrolysis of the hemicelluloses, a barium salt was isolated which consisted of a methoxyuronic acid combined with 2 molecules of *d*-xylose. The composition of these hemicelluloses suggests that they originate by partial oxidation and decarboxylation of starch or dextrin. Pectic materials were isolated that appear to be identical with pectic acid. *From authors' summary.*

31.3 : 12.26–8 : 12.25. Bloom, P., Jahn, E. C., and Wise, L. E. **Monoethanolamine extraction of wood for the determination of cellulose.** *Paper Tr. J.* 115 (10), 1942 (33–40). P.R.

Factors influencing the delignification of Aspen and Sitka Spruce by monoethanolamine, such as time, temperature, particle size, and liquor ratio, were studied. Alpha-cellulose digested in monoethanolamine suffered practically no loss, but Aspen holocellulose lost about 18 per cent. leaving a residual cellulose equivalent in yield to that obtained directly from the wood by the Cross and Bevan method.

A suitable method for determining cellulose in wood is to digest 60–80 mesh sawdust in monoethanolamine for 2 hours at 168–170° C., followed by chlorine water-sodium sulphite treatments (2 for hardwoods and 3 for softwoods). Cellulose obtained by the usual Cross and Bevan method and the monoethanolamine procedure are broadly similar in their chemical composition.

There is a marked difference in the behaviour of hardwoods and softwoods to monoethanolamine; the former delignify easily and the latter with difficulty. *Authors' summary.*

31.3 : 33.32. Wen-hsien Wan Chen, and Cameron, F. K. **Cellulose content of cotton and southern woods.** *Industr. Engng. Chem.* (*Industr. Ed.*) 34, 1942 (224–5). [University of North Carolina.] L.S.

In the tests made, using cotton and fifteen typical southern woods, it was found that the alpha-cellulose content of whole cotton is generally higher than that of woods, and that the latter is comparable with the cellulose in the stems or cusps of cotton.

31.4. *Durability. Decomposition*

31.41. Natural Durability

31.41 : 33.8. Hardy, E. **Woods for dye vats and chemical storage.** *Text. Rec.* 60 (711), 1942 (35, 37). O.R.S.

Kauri Pine (*Agathis australis*) from New Zealand is one of the best woods for use in containers for acid liquids, and this species and Teak (*Tectona grandis*) are two of the few woods with any considerable resistance to alkalis. Other woods suitable for containers for corrosive chemicals include Louisiana Gulf Cypress (*Taxodium distichum*?), Douglas Fir (*Pseudotsuga taxifolia*), Pitch Pine (*Pinus rigida*), which is serviceable for many cold acids but not for hot liquids, and Nigerian Satinwood (*Distemonanthus henthamianus*). The new laminated, densified woods have greater acid-resisting and moisture-resisting properties than ordinary solid wood but have not yet been fully tested in service.

Factors affecting the resistance of wood to corrosive chemicals are discussed briefly.

31.42. Attack by Plant Organisms

31.42.11 : 12.11 : 12.21. Birkinshaw, J. H., Findlay, W. P. K., and Webb, R. A. **Biochemistry of the wood-rotting fungi. 3. The production of methyl mercaptan by *Schizophyllum commune* Fr.** *Repr.* from *Bio-chem. J.* 36, 1942 (526–9).

31.42.11 : 12.21 : 33.31. Zycha, H. Der Einfluss stickstoffhaltiger Salze auf die Zerstörung von Bauholz durch Pilze. **[The influence of nitrogenous salts on the decay of structural timber by fungi.)** *Angew. Bot.* 21, 1939 (455–79). [G.] R.A.M. 21 (509).

In a test in which calcium nitrate and magnesium sulphate were added to pure cultures of *Paxillus panuoides* on wooden sticks in dry quartz sand at the rates of 0·3, 0·6, and 1·2, and 0·5, 1·0, and 2·0 gm., respectively, the losses of weight at a moisture content of 54 per cent. after three to four months were 19·3, 18·1, 4·3, 7·1, 7·5, and 3·2 per cent., respectively. The corresponding figures for calcium nitrate (0·3 gm.) and the three magnesium sulphate doses at 47 per cent. humidity being 8·3, 5·2, 5·3, and 2·7 per cent., respectively; the control losses at the lower and higher moisture contents were 4·1 and 7·1 per cent., respectively. [Cf. *For. Abstr.* 2 (51).]

31.42.11 : 31.22.1. Rennerfelt, E. Die Bedeutung des Wassergehaltes für die Entwicklung der Holzfäulen. **[The importance of the water content in the development of wood rots.]** *Trävaruindustrien* 26, 1941 (184–7). [Sw.] *Abstr.* in *Holz* 4, 1941 (403). [G.] P.R.

31.43. Attack by Animal Organisms

31.43 : 12.26–8 : 13.2. : 24.31. **Prevention of *Lyctus* attack in sapwood of Spotted Gum.** *Mon. News Lett. Div. For. Prod. Aust.* No. 128, 1942 (2).

An experiment in the ringbarking of trees of *Eucalyptus maculata* just below the crown was successful in that the bole of the tree below the girdle was depleted of starch and so immunized against *Lyctus* attack.

31.43 : 13.2 : 13.14. Christian, M. B. **Biology of the powder-post beetles, *Lyctus planicollis* Leconte and *Lyctus parallelopipedus* (Melsh.) Parts I & II.** *Repr.* from *Louisiana Conserv. Rev.* 9 (4), 10 (1), 1940 (56–9; 40–2).

This paper records important and new biological data on *Lyctus planicollis* and *L. parallelopipedus* obtained in the course of experimental work on the control of these two species. The life cycle and general habits of the beetles are described and the differences between the two pointed out. Only the sapwood of ring-porous woods is attacked, the eggs being laid in the open pores. The application of pore fillers such as shellac, paints, varnishes, etc., may therefore be useful in preventing attack. The food of the larvae consists primarily of starch, and some means may be found of depleting the starch content and thus rendering the wood unattractive. It is known that all stages can be killed by heating the infested material in a saturated atmosphere for a minimum of 1½ hr. after all portions of the wood have reached 130° F., but this method is expensive, and there is no safeguard against further infestation. Temporary control can also be obtained by saturation in orthodichlorobenzene. Insect enemies of the *Lyctus* beetle are common. Six species were taken from infested wood during the study—two predaceous Clerids (*Tarsostenus univittatus* (Rossi) and *Monophylla terminata* (Say)) and four parasitic wasps (*Monolexis lycti* (Cress), *Sclerodermus macrogaster* Ashmead, *Heterospilus* n. sp. and *Ecphylus* n. sp.). The habits of the two most common, *T. univittatus* and *M. lycti*, are described.

31.43 : 13.2. **Termites in buildings.** *Repr.* from *Fmg. S. Afr.* October, 1941. pp. 4. I.I.E.

Termite damage to buildings in South Africa is largely caused by the following species:—*Macrotermes natalensis*, *Termes swaziae*, *T. bellicosus*, *Odontotermes badius*, and *T. latericius*, which are responsible for the destruction of wallpaper and woodwork, and *Hodotermes* spp. which tunnel in green brick walls and plaster. Life histories of these insects are outlined, and suggestions are made for the protection of woodwork against the wood-attacking species. The recommendations of the Natal Public Works Department for the construction of termite-proof buildings are quoted at length, and advice is given on the measures to be adopted when termite infestation has already taken place.

31.43 : 13.2. Veen, R. van der. Termieten in onze bergcultures. **[Termites in Java.]** *Bergcultures* 16, 1942 (74–6). [Du.] Hort. Abstr. 12 (159).

A short account of the four species of termite which in Java attack *Hevea*, coffee plants and dry wood including 3-ply wood. They are *Coptotermes curvignathus* (*Hevea*), *Microtermes insperatus* and *Macrotermes gilvus* (coffee), and the indigenous species *Cryptotermes buitenzorgii* (wood).

31.43 : 13.2 (69) : 33.36.1. Mamet, R., and Durocher-Yvon, F. Les termites. **[Termites.]** *Rev. agric. Maurice* 21, 1942 (197–207 + plates). [F.] L.S.

A general discussion on the habits of termites and on the social structure of a termite colony. The principal species recorded in Mauritius are *Heterotermes philippinensis*, *Kalotermes pallidus*, *Nasutitermes voeltzkowi* and a species of *Coptotermes* related to *C. intermedius*. Of the three main methods of control discussed, impregnation of wood with toxic substances, although excellent, is not at present practicable in Mauritius owing to the lack of equipment; fumigation is not always completely successful, and many fumigants are extremely inflammable; the injection of toxic powders into the galleries or the nest appears to be the most satisfactory method. Various substances suitable for this purpose are listed.

31.43 : 13.2 : 92 (931). Clark, A. F. **Termite legislation in New Zealand.** *N.Z. J. Sci. Tech.* 23 (1B), 1941 (23B–32B). I.I.E.

Australian subterranean termites, including *Coptotermes acinaciformis*, *C. lacteus*, and *C. frenchi*, have become established in two areas in New Zealand, and severe damage is being caused to houses and other buildings, while trees, transmission poles, fence posts, sleepers, etc. are also infested. Special legislation, passed in 1940, forms the basis for the termite-control campaign which has been instituted.

31.43 : 13.2 : 38.2. United States. **Report of the Chief of the Bureau of Entomology and Plant Quarantine, 1941.** Superintendent of Documents, Washington, D.C., 1942. pp. 120. I.I.E.

Recent recommendations for preventing termites from reaching wood used in low-cost buildings do not

nclude the general use of metal shields on foundations ut rather stress the need for maintenance of conditions hat will prevent large populations of termites from leveloping in the soil, the use of foundations that are mpervious to termites, the importance of annual nspections and the prompt application of control neasures where necessary (p. 24).

31.8. *Quality and Defects of Timber*

31.8. New South Wales. **Report of the Forestry Commission for year ended 30th June, 1941.** Govt. Printer, Sydney. 1942. pp. 12.

As lead and zinc were found to be readily corroded n air when in contact with wood sap it is inadvisable o use green timber for backing printing blocks made of hese metals (p. 5).

31.8 : 12.26–8. Australia. **Council for Scientific and Industrial Research. Division of Forest Products. Annual report, 1941–42.** [Melbourne. 1942?] pp. 15.

From examination of specimens of Queensland Maple (*Flindersia brayleyana*) it was found that brittle heart was common in all material with Izod values less than 6 ft. lb. and rare in material with Izod values greater than 7 ft. lb. (p. 13).

31.8 : 12.26–8 : 31.2 : 31.3. Australia. **Council for Scientific and Industrial Research. Division of Forest Products. Annual report 1941–42.** [Melbourne. 1942?] pp. 15.

In examination of the properties of material containing bands of tension wood taken from young bent trees of *Eucalyptus* spp. it was observed that:—(1) there was a definite relation between distribution of tension wood and distribution of brittle heart; (2) tension wood showed abnormal collapse during air-drying; (3) tension wood zones were much higher in basic density than normal wood from the same tree; (4) tension wood showed a higher cellulose content and a lower lignin content than did normal wood (p. 13).

32. HARVESTING OF WOOD. LOGGING

32.1. *Marking of Trees and Coupes*

32.1 : 07.7 : 32.4. Rulison, D. E. **Specifications and instructions for use of the spray gun for marking timber.** *Tech. Note Ntheast. For. Exp. Sta.* No. 48, 1942. pp. 2.

Experience has shown that best results are obtained with a gun having specifications equal to those of the Alemite spring spray gun—model 6121, equipped with a solid oil stream nozzle—after a few minor alterations have been made. Red oxide barn paint mixed with an equal part of kerosene has proved satisfactory as a paint mixture. The gun has been found useful in checking inventories of logs and lumber as well as in marking standing timber.

32.2. *Felling and Related Operations*

32.25 : 07.7. **Perfects new chain saw filing method.** *W. Cst. Lumberm.* 69 (10), 1942 (16, 18, 69).

A filing rack is used so that the teeth of the chain saw may be filed in the same relative position that they assume on the power-saw frame when in operation. Tools that have been perfected to use with this rack include a raker gauge, jointer, and setting tool.

32.25 : 07.7. Challenger, J. W. **Five years of power sawing.** *Timberman* 44 (1), 1942–43 (10–3).

A brief account of the progress made in the use of power saws for felling and cross-cutting in logging operations in British Columbia. The most recent development is a one-man power saw weighing about 60 lb. for use in cross-cutting.

32.25 : 07.7 : 33.06 : 81. **How to cut wood with less labor.** *Conn. For. & Park Ass. Publ.* No. 43, 1942. pp. 22.

With an increasing demand for wood fuel and a shortage of labour to produce it, there is need for improving production efficiency. The present bulletin gives results of research in the northeastern United States on labour-saving methods and equipment for use in fuelwood production, including the organization of a wood-production crew working with and without power equipment.

32.25 : 33.02 : 82. Koroleff, A. **Woodcutters' handbook.—How to cut more pulpwood safely without greater effort.** Woodlands Section, Canadian Pulp and Paper Association, Montreal. 2nd ed., 1942. pp. 24 + plate.

A well-illustrated practical guide for wood-cutters. The booklet is also available in French.

32.25.4 : 07.7. Garver, H. L., and May, P. G. **Small electrically operated cross-cut saw.** Bureau of Agricultural Chemistry and Engineering, U.S.D.A. No. ACE–114, 1941. pp. 6 + plates.

Description of a unit driven by a ¼-h.p. motor and claimed to work satisfactorily with logs up to 15 in. in diameter.

32.29.1 : 01.4. Swarbrick, T. **Hedge and tree-stump clearing.** *Bull. Minist. Agric., Lond.* No. 101, (4th ed.) 1942. pp. 13 + plates. [University of Bristol Research Station.]

Notes on common manual and power methods, and on the use of explosives in stump clearing.

32.4. *Inventory and Evaluation of Felled Timber*

32.4 : 12.25. Lodewick, J. E. **Douglas Fir log values. Parts I, II, and III.** *Timberman* 43 (11), 1941–42 (18, 20, 24); (12), 1941–42 (18–20); 44 (1), 1942–43 (26, 28, 30, 32).

Report on a study conducted at a representative mill under the auspices of the Pacific Northwest Forest and Range Experiment Station, in which values in the mill pond were determined for logs of different sizes and qualities of Douglas Fir from the Oregon Cascades.

32.9. *Transport*

32.91.11 : 82. Koroleff, A. **Skidding teamster's handbook.—Efficiency in skidding of wood and handling of horses.** Woodlands Section, Canadian Pulp & Paper Association, Montreal. 1942. pp. 27.

A well-illustrated practical guide for workmen engaged in the extraction of logs, using horses. The booklet has also been published in French.

32.91.4 : 07.7. **Electric powered log transfer system.** *W. Cst. Lumberm.* 69 (11), 1942 (14–5, 72).

Description of a method of transferring an entire truck load of logs to railroad cars in one operation, using electric power.

32.95. Schädelin, F. Über Seilriesen in der Forstwirtschaft. **[On the use of ropeways in forestry.]** *Schweiz. Z. Forstw.* 93, 1942 (259–60). [G.]

33. CONVERSION AND PRESERVATION OF WOOD

33. McFee, R. E. **Conservation and timber use.** *J. For.* 40, 1942 (956–8).

Suggestions are made whereby timber specifications would be adapted more closely to actual requirements, thus preventing an unnecessary waste of timber. E.g., a 12 × 12-in. timber is normally cut from a log with a minimum d.i.b. of 17 in.; if the timber is taken from a log of 16-in. diameter, although the corners have triangular cross-sections of bark ¾ × ¾ in. in size, the area of sound wood is reduced by only 0·8 per cent., resulting in a reduction of moment of inertia and section of modulus of only 2·2 per cent. Other examples are cited.

33.0. *Utilization Categories of Wood*

33.0. **Some uses in forest products in substitution for steel and tin.** *B.C. Lumberm.* 26 (11), 1942 (24–5).

Lists are given of steel and tin products for which wood or wood derivative may profitably be used under emergency conditions. Suggested substitutions are classified as 'commercially used now', 'largely developed' and 'more development required'.

33.0 : 33.15 : 33.36.3 : 33.32 : 33.31 : 33.8. Winslow, C. P. **Wood goes to war.** *Sth. Lumberm.* 165 (2081), 1942 (143–7). [Forest Products Laboratory, Madison, Wis.]

The author outlines some recent developments in the treatment and use of wood to increase its serviceability, based on research at the U.S. Forest Products Laboratory.

33.1. *Mechanical Conversion excluding the Manufacture of Mechanical Pulp*

33.1 : 12.25 : 22.88.2 : 33.01 : 33.09. McCulloch, W. F. **Utilization of second growth Douglas Fir.** *W. Cst. Lumberm.* 69 (11), 1942 (26, 28).

Includes data from four mills which suggest that less than 55 per cent. of the log volume is recovered in converting timber from young stands (less than 80-year old).

33.14. Match Manufacture

33.14 : 12.26–8. Australia. **Council for Scientific and Industrial Research. Division of Forest Products. Annual report 1941–42.** [Melbourne. 1942?] pp. 15.

Tests have shown that with correct technique and careful selection of logs satisfactory match splints can be made from Mountain Ash (*Eucalyptus regnans*), though peeling is more difficult and percentage of waste greater than with the species normally used (p. 4).

33.15. Manufacture of Veneers and Laminated Wood. Gluing

33.15. **A new wood material: Hydulignum.** *Brit. Plast. mould. Prod. Tr.* 14, 1942 (381–4). P.O.

Birch veneers about $\frac{1}{36}$ in. thick are treated with a special thermo-plastic resin ('Formvar'), placed in packs of about 60 plys each, and these are consolidated under heat and pressure to a board about 1¼ in. thick, pressure being applied on the sides as well as top and bottom surfaces in order to increase the density. This process gives a relatively homogeneous material with properties particularly suitable for use in the construction of aircraft propellers. [See also *Wood* 7, 1942 (216); 8, 1943 (3–7).]

33.15. **Rules for using cold water glues in warm weather.** *Sth. Lumberm.* 165 (2077), 1942 (60).

33.15. **Testing plywood.** *W. Cst. Lumberm.* 69 (10), 1942 (40).

Note on the testing routine at the plywood plant of the Smith Wood-Products Company, Coquille, Oregon.

33.15 : 12.25 : 12.26–8 : 31.27. Australia. **Council for Scientific and Industrial Research. Division of Forest Products. Annual report 1941–42.** [Melbourne. 1942?] pp. 15.

As a result of tests, Hoop Pine (*Araucaria cunninghamii*), Sassafras (*Doryphora sassafras*), Brush Mahogany (*Geissois benthami*) and a number of other species have been accepted for use as plywood in the manufacture of folding boats, pontoons, etc. (p. 5). It has been found that Mountain Ash (*Eucalyptus regnans*) gives an improved wood with a much higher Izod than Scented Satinwood (*Ceratopetalum apetalum*) and with about the same shearing strength (p. 6).

33.15 : 12.26–8. New South Wales. **Report of the Forestry Commission for year ended 30th June, 1941.** Govt. Printer, Sydney. 1942. pp. 12.

A heat reactive casein-formaldehyde glue, which can be used at lower temperatures than artificial resin glues, was developed and has proved satisfactory for thick veneers. Numerous tests were carried out to make it applicable to thin veneers.

Satisfactory sliced veneers were obtained from Brush Box (*Tristania conferta*) and Red Almond (*Alphitonia excelsa*) (p. 4).

33.15 : 12.26–8 : 31.2 : 33.0. **Densified laminated wood for engineering uses.** *Engineer, Lond.* 174, 1942 (219–21). O.R.S.

A note on the manufacture, properties and uses of two improved woods—'Jabroc' and 'Insul-Jabroc'—put out by Moulded Components (Jablo), Ltd. They are built up from a series of veneers of selected woods, the arrangement of the veneers varying according to the use to which the final product is to be put, and the veneers are bonded together by means of resin impregnation under great pressure and heat. Timbers used for this purpose include Birch, Beech and Mahogany, and well known resins include phenol-urea, cresol-formaldehydes in liquid form, and phenol-formaldehyde in sheet form. Advantages of this improved wood over other materials are its mechanical strength, lightness, non-corrosive characteristics, and its capabilities of resisting moisture and acid. Tensile strength is shown to vary from 22,000 lb. to over 34,000 lb. for densities of 0·9 to 1·4, and compressive strength from 11,450 lb. to about 23,000 lb. Among the many uses for this wood are included small ships' propellers, blades for fans, rail and motor-car coachwork, and jigs and tools.

33.15 : 31.2. Tamblyn, N. **Australian made improved wood: its properties and uses.** *Aust. Timb. J.* 8, 1942 (904–5, 926). [Division of Forest Products, C.S.I.R.]

The Division of Forest Products, Melbourne, has carried out extensive investigations on the manufacture of improved wood from Australian timbers, and recently the manufacture of propellers from improved wood has been undertaken by two Sydney firms.

33.15 : 31.22.1. Irschick, E. Das Stehvermögen von Sperrholzplatten. **[The resistance of plywood boards to**

leformation with changing moisture content.] *Holz* 5, 1942 (309–12). [G.g.] P.R.

A plywood board having good resistance to deformation does not warp in subsequent use and does not develop a wavy surface. In most cases warping results solely from too high a moisture content at the time of joining the veneers. This moisture content should be 6–7 per cent. if subsequent warping is to be avoided. The resistance of boards to 'wave' formation on their surface is conditioned largely by the extent to which the moisture content of the boards at the time of polishing (Schleiffeuchte) is increased or decreased in subsequent use. From the writer's investigations with Spruce and Okumé (*Aucoumea klaineana*) boards it is suggested that, under German conditions, this moisture content (Schleiffeuchte) should be kept at 9–10 per cent.

33.15 : 34.6. Wyss, O. Homogenholz als neuer Werkstoff, Eigenschaften und Anwendung. [**The new material, 'Homogenholz', its properties and uses.**] *Chem. Technik* 15, 1942 (57–8). [G.] P.O.

This material consists of felted fibres assembled around a stiff resinous skeleton serving as binder, and shows the same mechanical properties in all directions. Joinery boards of a density of 0·5–0·6 and hard boards of a density of 0·8–1·0 are the two main Homogenholz products. The former are used in the furniture industry and for internal decoration, the latter mainly for flooring. Homogenholz can be readily standardized and moulded and is resistant to rot. The fibres are obtained from sawmill waste, straw, or grasses. The patent rights for the new material are held by The Holig Homogenholz G.m.b.H.

33.17. Sawmilling

33.17 : 07.7. **Circular saws.** *Leafl. For. Prod. Res. Lab.* No. 23, 1942. pp. 8.

General notes on their design and use.

33.17 : 07.7. Biermann, O. Blockbandsäge oder Gattersäge. [**Band saw or frame saw.**] *Holz* 5, 1942 (275–81). [G.g.] P.R.

The author discusses the relative advantages of the two types of saw and suggests that the frame saw is the more suitable for softwood timber up to a diameter of about 45 cm.

33.17 : 33.91 : 31.8. **How to produce aircraft lumber.** *W. Cst. Lumberm.* 69 (11), 1942 (10–13, 54, 58).

Note on the production of timber for aircraft construction in the northwestern United States, and the qualities and defects of such timber. The principal species used are Douglas Fir, Spruce, Noble Fir, and Hemlock.

33.3. *Chemical Treatment*

33.3 : 34.26. **Preparation of extractive-free wood. TAPPI tentative standard T12m–42.** *Paper Tr. J.* 115 (17), 1942 (36). P.R.

33.32. Pulp and Paper Manufacture. Plastics

33.32. Esser, H. Prägung von Holzfaserplatten. [**The imprinting of wood fibre boards.**] *Holz* 5, 1942 (273–5). [G.g.] P.R.

33.32. Ploetz, T. Versuche über den Aufschluss des Holzes. [**Experiments on the pulping of wood.**] *Holz* 4, 1941 (380–6). [G.g.] P.R.

The experiments were undertaken to find ways by which the by-products of cellulose manufacture can be obtained in a more readily utilizable form. The hemicelluloses are separated and preserved from destruction by means of an acid pre-treatment of the raw material (Beech wood, wheat straw). The preliminary hydrolysis is carried out preferably by the percolation process and is directed so that the cellulose can be extracted from the residue.

33.32 : 12.21. Niethammer, A. Wachstumsmöglichkeiten mikroskopischer Pilze auf Sulfitzellulose und Holzschliff sowie Sulfitablauge. [**The possibilities of growth of microscopic fungi on sulphite pulp and mechanical wood pulp as well as sulphite waste lye.**] *Holz* 5, 1942 (269–73). [G.g.] [Institut für Biochemie u. Nahrungsmittelchemie der Deutschen Technischen Hochschule, Prag.] P.R.

33.32 : 12.21. Rennerfelt, E. Das Wachstum einiger Pilze aus Holzschliff bei verschiedener Temperatur. [**The growth of some fungi from mechanical wood pulp a various temperatures.**] *Arch. f. Mikrobiol.* 12, 194 (19–40). R.A.M. 21 (58–9).

33.32 : 12.25. Chidester, G. H., and McGovern, J. N **Sulfite pulp from Lowland White Fir.** U.S. Forest Products Laboratory, Madison, Wis. *Mimeo.* No. *R*1404, 1942. pp. 8. P.R.

Heartwood and sapwood portions separated from a Lowland White Fir (*Abies grandis*) sample, having a medium density and high total and alpha cellulose contents, have been pulped by the sulphite process to produce pulps covering a range of bleachability. The important results were:—(1) An increase in bleach requirement of the heartwood and sapwood pulps from 8 to 20 per cent. corresponded to a decrease in cooking time of 1·5 hours, an increase in yield of 1·5 per cent., a decrease in total cellulose content of 3 per cent., small increases in lignin and pentosan contents and slight increases in bursting and tensile strengths. The tearing strengths passed through a maximum in the bleach requirement range. The alpha cellulose content of the pulps did not vary with the bleach requirement. (2) For pulps having the same bleach requirement those from the sapwood were lower in yield by 1 per cent., had slightly higher lignin and total and alpha cellulose contents, and showed somewhat lower amounts of material soluble in ether than the heartwood pulps. The sapwood pulps were slightly lower in bursting and tensile strengths and somewhat higher in tearing strength. (3) In comparison with average Spruce and Western Hemlock sulphite pulps, the Lowland White Fir pulps were produced in slightly higher yields, had pulp strengths closely the same, and were appreciably higher in total and alpha cellulose contents. *Authors' summary.*

33.32 : 38.2. Schaffer, R. J. **The use of plastics in building.** *Chem. & Ind.* 61, 1942 (357–61). L.S.

33.36. Preservation of Wood. Seasoning and Drying

33.36.1. *Preservation against Attack by Plants and Animals*

33.36.1. Boliden's Gruvaktiebolag. **Improvements in and relating to the preservation of wood and like organic substances by impregnation.** *British Patent* No. 544,049, March 1942. pp. 2.

Describes an impregnating agent for the preservation of wood, etc., which contains arsenic acid and ferrous salt in substantially equimolecular proportions in aqueous solution. Following impregnation with this solution, ferric arsenate is precipitated in the material by a chemical reaction. Ferric arsenate is with difficulty soluble in water and has a high mycocidal and insecticidal effect.

33.36.1 (68.9). FINLAY, R. H. **The preservation of timber, with special reference to Rhodesia.** *Proc. Rhod. sci. Ass.* 39, 1942 (103–12). [Department of Agriculture.] O.R.S.

The author discusses the preservatives and methods of treatment in general use and gives details of the equipment and operation of the preservative treating plant at Mtao.

33.36.1 : 07.7. DANILOVSKI, A. Mechanische Auftragung pilztötender Lösungen auf Holz. **[Mechanical application of fungicidal solutions on wood.]** *Stroitel'naya Promȳshlennost'* 18 (11), 1940 (40–1). [R.] *Abstr.* in *Holz* 4, 1941 (407). [G.] P.R.

The device described consists of a 16-l. container, a hose, a spraying pistol, and a small air compressor. The Belikov type of pistol giving a flat jet is very suitable and assures an even distribution of the solution on the wood surface. It is essential to use solutions that do not precipitate easily, e.g., (1) 44 (or 43) per cent. sodium fluoride, 28·5 (or 28) per cent. sulphite lye, 2·2 (or 2) per cent. peat dust, and 25·5 (or 26·8) per cent. water; (2) 14 per cent. sodium silico fluoride, 16 per cent. sulphite lye, 20 per cent. sodium carbonate, 5 per cent. water glass, and 45 per cent. water.

33.36.1 : 12.25. BUCKMAN, S. J., and PERA, J. D. **Non-pressure treatment of wood: cold soaking treatment of Southern Pine sapwood with a low viscosity oil solution of pentachlorphenol.** *Sth. Lumberm.* 165 (2081), 1942 (223–6). [Central Laboratories, Inc., Memphis, Tennessee.]

A detailed account is given of a study undertaken to obtain information on the factors influencing the cold soaking treatment of Southern Pine sapwood with a low viscosity oil solution of pentachlorphenol. Test material included 1-ft. sections of 1 × 6-in., 2 × 6-in., and 4 × 6-in., Southern Pine lumber, and Southern Pine posts sawn into sections mostly 1 ft. long. The preservative used was a 5-per-cent. solution of pentachlorphenol (1 part Permatox A Concentrate in 10 parts of kerosene). All treatments were conducted in a vertical tank 22·5 in. in diameter and 101 in. deep. Before treatment all end surfaces of the pieces of lumber and of the sections of posts, except the original top and butt surfaces, were covered with two coats of sodium silicate followed by one coat of shellac to eliminate end penetration. Variables in the experiment were depth of immersion (1, 4 and 7 ft.) and time, which varied from 0·25 to 24 hours.

Results showed a close linear relationship between preservative absorption and depth of immersion. Absorptions obtained for 1 × 6-in. lumber varied from 1·9 lb. per cu. ft. for pieces immersed to a depth of 1 ft. for 0·25 hour to 7·0 lb. per cu. ft. at 7 ft. for 24 hours; practically complete penetration was obtained for all specimens of 1 × 6-in. lumber. In comparison somewhat lower absorptions and less complete penetrations were obtained for 2 × 6-in. lumber and a further reduction was noted for 4 × 6-in. lumber, absorptions for which varied from 0·7 lb. per cu. ft. at 1 ft. for 0·5 hour to 4·5 lb. per cu. ft. at 7 ft. for 24 hours.

The posts were reconstructed, the pieces being held together by staples, and placed in the tank in a vertical position, the tops being 6 in. below the surface of the preservative. After 8 hours' soaking absorption varied from 3·3 lb. per cu. ft. in the butt to 1·7 lb. per cu. ft. in the top section and after 48 hours from 5·7 to 4·4 lb. per cu. ft.

33.36.1 : 12.26–8. SPOON, W. **Preservation of Balsa wood.** *Nederland. Boschbouw. Tijdschr.* 14, 1941 (491) [Du.] Chem. Abs. 36 (5329). P.R.

The wood is dried under a moderate vacuum and while still *in vacuo* is impregnated with a solution of paraffin and (or) rosin in benzine or benzene. The wood is thus made more effectively waterproof than by using molten paraffin or a 40–50 per cent. rosin solution in alcohol. The specific gravity is only very slightly increased.

33.36.1 : 31.22.1. SCHULZE, B., and THEDEN, G. Das Eindringen aufgestrichener Holzschutzmittel in Kiefernsplintholz. **[The penetration into Pine sapwood of wood preservatives applied by surface coating.]** *Holz* 5, 1942 (239–47). [G.g.] [Staatliches Materialprüfungsamt Berlin-Dahlem.] P.R.

Tests on the penetration of oil-type and water-soluble preservatives applied by brushing led to the following results:—The penetration of oil-type preservatives such as carbolineum tends to be obstructed if the moisture content of the wood is above fibre-saturation point. The depth of penetration tends to increase with the amount of oil applied, whether a given quantity is used in one operation or in two spaced six hours or three days apart. The depth of penetration of water-soluble preservatives such as copper-sulphate solutions tends to increase with the moisture content of the wood. Solutions of low concentration penetrate more deeply into very dry and air-dry wood than do those of high concentration, while the reverse is true for wet wood. Depth of penetration tends to increase with the amount of solution applied. If the brushing is interrupted and not resumed until the first coating has dried completely, the second coating does not increase the depth of penetration, although the salt concentration in the wood is increased.

33.36.1 : 35.15. LEWIS, H. C. **Finishing plywood aircraft.** *Industr. Finishing* 18 (8), 1942 (30–2, 34). P.O.

Treatments are suggested for plywood and fabric-covered plywood surfaces to give adequate protection with the minimum number of coats and to produce a finish satisfactory as regards smoothness and weight.

33.36.1 : 33.31. BOLLER, E. R. (to E. I. du Pont de Nemours & Co.) **Preserving wood.** *U.S. Patent* No. 2,277,660. 1942. Chem. Abs. 36 (4992). P.R.

In preserving wood or like material by impregnation with an aqueous solution containing Zn ions and ions of an acid of As, the Zn and As are fixed in the fibres of the material by heating the impregnated material while containing water in excess of the fibre saturation point under conditions such that a substantial portion of the impregnated material is heated to a temperature of at least about 220° F. for at least about a half hour (the heating being effected out of contact with impregnating solution containing Zn or As).

33.36.1 : 33.31. NOWAK, A. Neuere Erkenntnisse über Holzimprägnierung. **[Some recent data on wood impregnation.]** *Chem. Technik* 15, 1942 (56–7). [G.] P.O.

Commercial tests on the impregnation of wood with solutions of waxes, artificial resins, and similar

substances have opened up a promising field for further research. Timber and wooden articles of various dimensions (including hardwood and softwood timber, both dry and wet) were pressure-treated with 10–20 per cent. trichlorethylene solutions of coal-tar pitch, bitumen, montan wax, waste paraffins, waste resins of the petroleum industry, cumarone resin, etc., and the solvent recovered. Deep and even penetration was obtained, and the treated wood showed a considerable increase in strength properties and great resistance to moisture penetration, while the volatility of the impregnating substances was low. It appears that treatment assuring resistance to fungal and insect attack can be obtained using relatively small quantities of chemicals—an amount about equal to 10 per cent. of the weight of the wood.

33.36.1 : 33.31. Vysozki, P. G. Industrieabfälle zur Pilzbekämpfung im Holz. **[Industrial waste in combating fungus in wood.]** *Stroitel'naya Promÿshlennost'* 18, 1940 (39–40). [R.] *Abstr.* in *Holz* 4, 1941 (407). [G.] P.R.

Tests with *Coniophora cerebella* cultures showed the eminent suitability of shale-tar oils and of a shale-tar pitch derivative containing 4 per cent. of raw phenols for combating fungal attack. Similar tests in which stearine-petrol emulsions were applied to the wood gave negative results.

33.36.1 : 33.31. Wilson, D. M. **Bitumens, pitches and bituminous paints.**—With discussion. *J. Oil Col. Chem. Ass.* 25, 1942 (86–98). L.S.

The comparative properties of bitumens and the various pitches are discussed with reference to their use in bituminous paints. Such paints have good water resistance but tend to suffer eventually from oxidation. Particular attention is paid to the preparation of different bituminous materials for use as paints and to the resistance of such materials to weathering.

33.36.1 : 33.31. Wlassow, R. A. Bestimmung der Eindringungstiefe von Natriumfluorid in Holz. **[Determination of the depth of penetration of sodium fluoride into wood.]** *Stroitel'naya Promÿshlennost'* 19 (3), 1941 (36). [R.] *Chem. Zbl.* 16, 1942 (1868). P.O.

A new reagent, claimed to be more satisfactory than existing preparations, was obtained by dissolving 0·3 g. red phenol crystals in 100 cc. distilled water with 30 cc. alcohol and an addition of 2 per cent. concentrated H_2SO_4. The reagent gives a characteristic lemon-yellow reaction in the presence of NaF.

33.36.1 : 33.36.2 : 33.31. Gunn, G. **A new and improved composition for the preservation and fireproofing of wood, timber and other materials.** *British Patent* No. 546,256, 1942. Build. Sci. Abstr. 15 (n.s.) 1942 (51). P.R.

A composition for the preservation and fireproofing of wood and other combustible materials consists of a dichromate, copper sulphate, zinc chloride and boric acid in aqueous solution.

33.36.1 : 33.51. Bowen, J. W. **The preservation of timber and fabrics with reference to utilisation underground.** —With comment. *J. chem. Soc. S. Afr.* 42, 1941 (122–42). [Timber Research Laboratory, Transvaal Chamber of Mines.] P.O.

The type of fungi that cause decay in timber and the process and changes involved are indicated briefly. This is followed by an account of timber preservation against fungal and insect attack with reference to mining timber. The preservative at present used by the mining industry in South Africa is a mixture of zinc sulphate and triolith (Wolman salt composed of sodium fluoride, potassium dichromate and dinitrophenol), the timber being placed in a preservation cylinder and treated for 20 minutes at 70 lb. air pressure. Factors that have been found to effect the penetration and absorption of the preservative are listed as follows:—(1) For air pressures of up to 110 lb./sq. in. absorption of preservative increases correspondingly with the pressure. (2) Most of the preservative is absorbed within the first five minutes. Continued treatment, however, increases the quantity of preservative absorbed. On being subjected to pressure for twenty minutes, timber absorbs 82 per cent. of the preservative which it would absorb if subjected to the same pressure for one hour. (3) The temperature of the treatment solution in the case of relatively easily impregnated woods has little effect on increasing absorption. (4) Dry timber absorbs more preservative than green timber. (5) Drawing a vacuum prior to the application of pressure brings about a considerable increase in absorption of preservative.

An account is also given of the decay and preservation of fabrics used underground.

33.36.1 : 33.54. **The preservative treatment of fencing posts.** *N.Z. J. Agric.* 65, 1942 (85–7, 89, 91). [New Zealand State Forest Service.] O.R.E.

The timber should be barked as soon as it is felled and then thoroughly seasoned by open crib-piling in a suitable locality. The preservative recommended is creosote to be applied by the open-tank process. Construction and operation of treating plant are described, and recommended treatments are tabulated for a number of tree species.

33.36.1 : 33.54 : 76.1. Borg, J. Ett och annat om kostnader för stängelstolpar samt ev. impregnering av dessa. **[One thing and another concerning the cost of fence posts and their eventual impregnation.]** *Svenska Vall-MosskFören. Kvart* 4 (1), 1942 (49–63). [Sw.] R.A.M. 21 (509).

A discussion of the cost of fence posts for agricultural concerns in Sweden, and of the economics of impregnation against fungal decay. At present the only treatment that can be recommended as practicable is preservation with arsenic salts with a 0·1 per cent. arsenic acid content carried out either by the open-tank or osmosis process.

33.36.1 : 33.54. Starker, T. J. **Preservative treatments of fence posts. 1940 progress report on the Post Farm.** *Bull. Ore. Engng. Exp. Sta.* No. 9–B, 1940. pp. 4.
33.36.1 : 33.54. Starker, T. J. **Preservative treatments of fence posts. 1941 progress report on the Post Farm.** *Bull. Ore. Engng. Exp. Sta.* No. 9–C, 1941. pp. 5.

Cf. *For. Abstr.* 2 (153). The reports for 1940 and 1941 give additional information on the series of posts under observation. Two series of Douglas Fir posts, one charred and one treated with asphalt emulsion, failed 100 per cent. (failed to resist 50-lb. pull 2 ft. from the ground) after an average life of 76 months and 75 months respectively.

33.36.1 : 38.2 : 31.27. Liese, J. Gegenwartsfragen des Holzschutzes, insbesondere des Holzschutzes in Luftschutzräumen. **[Present-day problems of wood preservation with special reference to timber used in air-raid shelters.]** *Chem. Technik* 15, 1942 (57). [G.] P.O.

Attention is called to the importance of protecting against fungal attack the timber used in the construction

of air-raid shelters. Many shelters offer very favourable conditions for the development of rot. It is pointed out that at room temperature and under suitable conditions for fungal attack the compression strength of Pine timber, along the grain, may be halved within two months. The attack need not be outwardly noticeable.

33.36.1 : 42.5 : 38.6. **Creosoted wood stave pipe and its effect upon water for domestic and irrigation uses.** *Wood Pres. News* 20, 1942 (122–5, 128–30, 138–9, 142). *Repr.* from *Bull. Univ. Wash. Engng. Exp. Sta.* No. 1. P.R.

Results from the experiments described indicate that the amount of creosote which diffuses into water in ordinary creosoted pipes does not adversely affect drinking water, and imparts no noticeable taste after the first month. Also it has no appreciable injurious effect upon plants, either in the time of germination, the percentage of germination, the rapidity of growth, or the general vigour of the plant.

33.36.2. *Fireproofing*

33.36.2 : 33.31. **Fire repellant for wood: new water soluble treatment effective in fire prevention.** *Sth. Lumberm.* 165 (2077), 1942 (56).

The new product ('Firepel') is an aqueous solution of fire-retardant chemicals designed for application by brush or spray to unfinished wood surfaces. Wood so treated will retain its fire-retardant qualities indefinitely when not exposed to weather.

33.36.2 : 33.31. WAGNER, E. **Fire-retardant substitute paint for wood.** *Seifensiederztg.* 68, 1941 (297–8). [G.] Chem. Abs. 36 (5286). P.R.

As fire-retardant coatings for wood Na or K waterglass or a solution of colloidal silicic acid in NaOH may be used with or without substances such as clay, chalk, glass powder, slag, asbestos powder, loam, magnesite, cement, graphite, heavy spar or lithopone. An especially useful substitute paint is composed of 30 per cent. soapstone and 70 per cent. of 40° Bé. Na waterglass. The ignition temperature of wood can be raised as much as 200–225° by treatment with 10 per cent. NaOH, K_2CO_3 or Na_2CO_3 solution. For short exposure to fire, wood may be protected by treatment with aqueous suspensions of chalk, cement, loam or gypsum, suitable binders being $MgCl_2$, KF and certain organic materials.

33.36.2 : 33.32. METZ, L. Brennbarkeit und Feuerschutz von Holzfaserplatten. **[Combustibility and fire protection of wood fibre boards.]** *Chem. Technik* 15, 1942 (55–6). [G.] P.O.

Tests on thirty-six different commercial fibre boards showed that, broadly speaking, their combustibility is determined by their physical properties in much the same manner as that of wood. The species of wood used as raw material does not appear to have a significant effect; on the other hand, the influence of the nature and quantity of the binder (or of the impregnation substance) appears to be significant and requires further investigation. A surface coating with a frothing substance containing urea, resin, and ammonium phosphate proved the most useful of the fire retardants investigated, both for hard boards and for isolation boards ('Hartplatten' and 'Dämmplatten', respectively).

33.36.2 : 33.4. GOTTSCHALK, F. W. **Manufacture and use of fire resistant wood.** *Sth. Lumberm.* 165 (2081), 1942 (135–8). [American Lumber & Treating Co.]

New specifications for the fireproofing of wood require that formulas be made up of ammonium phosphate, ammonium sulphate, boric acid and borax. Standard treating methods are prescribed, the treatment being carried out in closed cylinders by a pressure process. Two degrees of fire resistance are recognized:— (1) 'moderate' (grade M) fire-retardance requires a retention of not less than 3 lb. of approved chemicals per cu. ft. of boards or dimension stock in Southern Pine, Red Oak, or Black Gum; (2) 'high' (grade H) fire-retardance requires a retention of not less than 6 lb. per cu. ft. for the same species. Refractory timbers and timbers of large size require lower retentions.

33.36.3. *Seasoning. Drying*

33.36.3 : 07.7. **Humidity controllers for kilns.** *Wood* 7, 1942 (216).

Note on the Foxboro Humidity Recorder-Controller. This is essentially a recording psychrometer equipped with a dual control system—that is, it is a wet- and dry-bulb recording instrument, which also controls humidity and heat, the wet bulb controlling the spray valve and the dry bulb the heating valve. The instrument also makes a written record of humidity conditions.

33.36.3 : 07.7 : 33.06. Trockenanlagen für Tankholz auf sowjetrussischen Schleppern. **[Drying equipment for producer fuelwood on Soviet tractors.]** *Holz* 5, 1942 (320). [G.] P.R.

The equipment described is mounted on the tractor and utilizes the waste heat from the engine for the drying of fuelwood. About 50 kg. of wood of 35–40 per cent. moisture content are dried to 15–18 per cent. moisture content within 1–1½ hours. The use of the drying device lowers engine power by 2–3 per cent., but this is quite insignificant compared with the gain in power resulting from the use of well-seasoned fuel.

33.36.3 : 07.7. **Vacuum kilns for drying timber.** *Aust. Timb. J.* 8, 1942 (902, 923). [Division of Forest Products, C.S.I.R.]

Short note on some common fallacies regarding vacuum kilns, which, it is stated, have been tried out on a commercial scale in Scandinavia, the U.S.A. and Australia, and have invariably proved a failure.

33.36.3 : 07.7. BARRETT, J. R. **Value and care of dry kiln instruments.** *W. Cst. Lumberm.* 69 (10), 1942 (60, 62).

Note on the protection of kiln instruments from corrosion, gumming-up, etc.

33.36.3 : 07.7. EGNER, K., and SINN, H. Über die Holztrocknung mit Grossschaukeln. **[On the drying of wood using large 'swing-racks'.]** *Holz* 4, 1941 (386–99). [G.g.] P.R.

Report on further tests on 'swing-rack' seasoning, which have broadly confirmed previous results [cf. *For. Abstr.* 2 (59) and 3 (147–8)]. The investigations included 'swing-rack' seasoning in a steam-heated shed, in which satisfactory results were obtained. Within a few days, Spruce timber 25 mm. thick having an average moisture content of 50–70 per cent. was dried to 15–20 per cent. moisture content. In its outward appearance straight-grained timber thus seasoned was not inferior to carefully kiln-dried timber. Warping in spiral-grained timber was severe, but it is thought that in future it will be possible to prevent this by means of suitable stretching devices.

33.36.3 : 07.7. HUGHES, A. D. **The improvement of reversible dry kiln fans.** *Bull. Ore. Engng. Exp. Sta.* No. 16, 1941. pp. 53.

One of the factors affecting kiln-drying expenses is the cost of power required for driving the fans. The bulletin describes various tests conducted with the aim of improving the performance of reversible fans. A special duct for testing full-size fans, 60 in. in diameter, was constructed, and fans of 22 different types and sizes were tested. Several new fans of improved performance were developed and new methods of test procedure and presentation of result were devised to facilitate the testing and selection of reversible fans for given kiln conditions. With the laboratory phases of the investigation practically completed, commercial tests are planned for the near future. *From author's summary.*

33.36.3 : 33.31 : 12.25. NEWINS, H. S. **Chemical seasoning of lumber.** *Proc. Fla. Acad. Sci. 1940* 5, 1941 (85–95). Chem. Abs. 36 (5329). P.R.

Of all the chemicals employed for treating wood, urea shows practically no handicap. It was applied successfully to Tidewater Red Cypress for air-seasoning. The use of NaCl was impracticable owing to its corrosive effect on metals, and its tendency to cause 'sweating'.

33.36.3 : 32.26. **Piling timber.** *Wood* 8, 1943 (14–5).

Note on methods of piling unseasoned timber to prevent cracking and deformation.

33.36.3 : 32.26. DESJARDINS, A. La cour à bois et les empilements pour le séchage à l'air libre des bois sciés. **[The timber yard and methods of stacking for the drying of saw timber in the open air.]** *Bull. Serv. for. Québec* (*n.s.*) No. 1, 1942. pp. 22. [F.]

A practical guide setting out the elements of air-seasoning timber.

33.36.3 : 32.26. REHMAN, M. A. **Stacking timber for air seasoning.** *Indian For. Bull.* (*n.s.*) *Utilisation* No. 95, 1941. pp. 9 + plate. [Forest Research Institute, Dehra Dun.]

Methods for obtaining the best results in the air seasoning of planks and scantlings. The horizontal and the vertical methods of stacking timber are described, and advice is given on the most suitable times for the conversion of very refractory, moderately refractory, and non-refractory woods, together with the period required for complete air seasoning. The most important Indian timbers are classified according to their behaviour during seasoning.

33.36.3 : 33.31 : 33.36.1. BERLINER, J. F. T. **Urea treatment of lumber.** *Mech. Engng.* 64, 1942 (181–6). L.S. Cf. *For. Abstr.* 3 (327).

33.36.3 : 33.52 : 12.26–8 : 33.91 : 31.8. REHMAN, M. A. **Experiments on the air-seasoning and notes on the passing of Sal sleepers.** *Indian For. Bull.* (*n.s.*) *Utilisation* No. 97, 1941. pp. iii + 25. [Forest Research Institute, Dehra Dun.]

From the tests described it appears that M.G. Sal sleepers stacked in close-crib manner under shade attain an average moisture content of about 20 per cent. in two years and become fully air-seasoned in about three years, when they attain a uniform moisture content of about 15 per cent. The information recorded about the passing of Sal sleepers shows that rejections due to seasoning degrade are negligible, since the sleepers are usually freshly cut at the time of inspection, but that a good many sleepers are rejected on account of excessive sapwood and boxed heart. *From author's summary.*

33.36.3 : 33.7. BRATTON, A. W. **Fuelwood seasoning tests.** *Tech. Note Ntheast. For. Exp. Sta.* No. 50, 1942. pp. 2.

Recent tests on Red Oak fuelwood show that length is of little importance in the seasoning of ordinary cordwood, but that diameter is a major factor. Splitting increases the rate of drying, and, to ensure uniform and rapid seasoning, sticks above 8 in. should be split once, and those above 12 in. twice.

33.36.3 : 33.7 : 12.26–8 : 31.22.1. REHMAN, M. A. **Drying of wood fuel of *Shorea robusta* (Sal), *Eugenia jambolana* (Jaman), *Machilus duthiei* (Kaula).** *Indian For. Bull.* (*n.s.*) *Utilisation* No. 96, 1941. pp. 8 + plate. [Forest Research Institute, Dehra Dun.]

From the three experiments described it is concluded that:—(1) the initial moisture content of fuel at the time of stacking varies with the season of the year and thus the percentage loss of weight of wood during storage depends on season of stacking—varying from 25 per cent. of the original weight for summer-stacked wood to 48 per cent. for winter-stacked wood; (2) split wood dries more rapidly than whole billets; (3) to obtain a final moisture content of 10–14 per cent. (the moisture content of fully dried fuel at Dehra Dun) requires from six to twelve months, depending on whether it is stacked in winter or later in the dry weather.

33.37. Distillation. Manufacture of Tar

33.37. Tjärtillverkning ur törestubbar. **[Manufacture of tar from dry wood stumps.]** *Svensk PappTidn.* 45, 1942 (470, 471). [Sw.] A.P.B. (P.O.)

About a hundred wood-distillation plants have been erected or are in course of erection in different parts of Sweden for delivery according to contract with the Forest Owners' Oil Company, Ltd., established in the summer of 1941. About 60 per cent. of these plants are at present in use. When the total number is working it is calculated that production will be about 20,000 tons of tar a year, a figure which does not fall very much below the 25,000 tons set up earlier as a desirable target.

33.38. Charcoal Manufacture. Use of Wood and Charcoal in Producer-Gas Generators

33.38. **The use of wood in Swiss gasworks.** *Gas World* 117, 1942 (418–21). P.O.

A series of tests of gas-making with wood was made in a small experimental plant at Horgen. Wood of different kinds and sizes as well as some samples of sawdust were carbonized in horizontal retorts. Species used included Beech, Fir, Pine, Oak, Lime and Birch. At Lausanne and Solothurn experiments with wood were made in intermittent vertical chambers. Results are tabulated.

33.38.1. **Further notes on the manufacture of charcoal in portable kilns.** *Leafl. For. Prod. Res. Lab.* No. 24, 1942. pp. 8. [Forest Products Research Laboratory, Princes Risborough, Bucks.]

A further supplement to *For. Prod. Res. Rec., Lond.* No. 29, on the technique of charcoal manufacture using the Princes Risborough type of kiln. [Cf. *For. Abstr.* 1 (183) and 2 (315).]

33.38.2. Lutz, H. Der Einheitsgenerator für Ackerschlepper. [**The standard producer for agricultural tractors.**] *Holz* 5, 1942 (230–5). [G.g.] P.R.

Description of an officially designed unit claimed to function satisfactorily with coniferous fuelwood as well as with hardwood fuels and at fuel moistures up to 40 per cent. The producer is also suitable for charcoal and peat fuels, and is stated to be of exceptionally solid construction.

33.38.2. Norlin, E. Normer för bilved och bilkol. [**Specifications for producer wood and producer charcoal.**] *Tekn. Tidskr. Automobil- och Motortekn.* 71 (5), 1941 (33–40). [Sw.] *Abstr.* in *Feuerungstechnik* 29, 1941 (189–90). P.O.

33.38.2 : 07.7. **Charcoal for gas producer plants.** *Rhod. agric. J.* 39, 1942 (334–40 + plates). L.S.

Essential and desirable properties of producer charcoal and factors affecting its quality and yield are discussed. Designs and operational details are given for two brick kilns developed by the Fuel Research Institute of South Africa.

33.38.2 : 07.7. Carrosserie Eggli Frères S.A. **A wood-burning gas generator.** *Swiss Patent* No. 217,431 (Cl. 13*e*), 1942. Chem. Abs. 36 (5338). P.R.

33.39. Manufacture of Sugar, Oils, Alcohol, and Vinegar from Wood

33.39 : 33.15. Overbeck, W. Über die Eigenschaften des Lignits im Hinblick auf die Verarbeitung in die Holzverzuckerung. [**On the properties of lignite with reference to its use in wood saccharification.**] *Holz* 5, 1942 (235–9). [G.g.] [Wissenschaftliches Hauptlaboratorium der Zellstoffabrik Waldhof, Werk Mannheim.] P.R.

From investigations on the chemical properties of lignite from Welzow, Nieder-Lausitz, its saccharification does not appear to be profitable.

33.4. *Converted Structural Timber*

33.4. **Typical framing construction. Scantling sizes for use in construction of one-storey residences recommended by the Division of Wood Technology, Forestry Commission, New South Wales.** *Timber Detail Sheet N.S.W. For. Comm. Div. Wood Tech.* No. 1, [1940]. pp. 2.

33.4 : 12.26–8 : 12.25. **Casement window for timber framed houses.** *Timber Detail Sheet N.S.W. For. Comm. Div. Wood Tech.* No. 2, [1941]. pp. 2.

33.5. *Pitprops. Sleepers. Poles and Other Roughly Converted Wood*

33.51 : 31.27 : 33.36.3 : 05.3 (410). Great Britain. **Ministry of Fuel and Power: Twentieth annual report of the Safety in Mines Research Board, 1941.** H.M. Stationery Office. 1943. pp. 28.

Tests on unseasoned pitprops of British-grown materials showed the following average crushing strengths in lb. per sq. in.:—(*a*) Larch—2,370 (from east of Scotland) and 2,860 (west of Scotland); Scots Pine—1,710 (east of Scotland) and 2,140 (west of Scotland); Oak—2,990, and Ash—2,820, both from Kent. The softwood props were 3–5 in. in diameter at small end and about 12 times the diameter in length; hardwood props were 7–3 ft. long, fairly straight and free of large knots (p. 16).

Tests with quartered and halved props indicated that they should have a cross-sectional area at least 1·5 times that of round props usually used. Quartered props from 7- and 8-in. diameter props failed readily at knots and also by longitudinal splitting along the annual rings (p. 18).

Reduction of the moisture content of props from about 30 to 15 or 16 per cent. by seasoning them for short periods in return airways underground increased their crushing strength by 20 to 50 per cent. This treatment usually results in longitudinal splitting but it has been found that dried props that are severely split are usually 20 per cent. stronger than similar props unsplit which have not been seasoned (p. 20).

33.6. *Packing Boxes, Crates, etc.*

33.6 : 33.15. **Rectangular plywood containers.** *Indian For. Leafl.* (*Utilisation*) No. 26, 1942. [pp. 2.] [Forest Research Institute, Dehra Dun.] P.R.

A brief, illustrated description of the method of manufacturing rectangular plywood containers for liquids, oils, greases, powders and solids.

33.7. *Firewood*

33.7 : 07.7. Hicock, H. W., Olson, A. R., and Seeley, L. E. **A wood-burning conversion unit for household furnaces.** *Bull. Conn. agric. Exp. Sta.* No. 463, 1942 (595–614).

Description of a unit of simple design built almost entirely of fire bricks and other non-strategic materials and used to replace oil burners in warm-air, steam, and hot-water heating systems. Wood of any moisture content can be used.

33.8. *Other Manufactured Products*

33.8. **Wooden bed springs: another wartime emergency use of wood.** *Sth. Lumberm.* 165 (2081), 1942 (240).

Wooden springs, manufactured by the Strand Ski Company of New Richmond, Wisconsin, are made mostly of selected Hickory and are designed to give triple spring action to each separate unit. Comfort, resilience and ease of packing and assembling are features of these springs.

33.8 : 33.15. **Wood springs pass all tests.** *Timber of Canada* 3 (4), 1942 (76).

Springs for mattresses, coaches and chairs, made of strips of veneer, have been tested and found to be as durable and satisfactory as metal springs, although their cost of production is considerably higher.

33.8 : 12.25. South Australia. **Woods and Forests Department. Annual report for the year ended 30th June, 1941.** Govt. Printer, Adelaide. 1942. pp. 12.

The wood of *Pinus radiata* has been found to be particularly suitable for the manufacture of explosives (p. 8).

33.8 : 12.25 : 12.26–8. **Wood flour for dry cells.** *Sci. & Cult.* 7, 1942 (552–3). L.S.

The fine wood dust of two Indian species, the Silver Fir (*Abies pindrow*) and the Semul Cotton tree (*Bombax malabaricum*), is suitable, after a simple treatment consisting of boiling, filtering and dehydration, as an inert filling material for dry battery cells.

33.8 : 12.25 : 33.36.1. **Los Angeles County develops treated Douglas Fir manhole cover.** *B.C. Lumberm.* 26 (12), 1942 (62).

Description of a manhole cover, used in sewer line construction, which is made of pressure-impregnated strips of wood, and rests in a concrete frame. Each unit saves approximately 500 lb. of cast iron.

33.8 : 33.15 : 12.26–8 (944). NEW SOUTH WALES. **Report of the Forestry Commission for year ended 30th June, 1941.** Govt. Printer, Sydney. 1942. pp. 12.

Bollywood (*Litsea reticulata*) and Coachwood (*Ceratopetalum apetalum*) appear to be the most suitable of native timbers for use in airframes and propellers. N.S.W. Walnut (*Endiandra virens*), Kanuka Box (*Tristania laurina*), Pink Walnut (*Endiandra sieberi*), Brown Cudgeri (*Bursera australasica*) and Rose Maple (*Cryptocarya erythroxylon*) show promise for use in aircraft plywood (p. 4).

34. MINOR FOREST PRODUCTS AND THEIR UTILIZATION

34.2. *Vegetable Products*

34.24. Tanning Materials. Cork

34.24 : 12.25 : 12.14.8. **Tannin from Western Hemlock bark.** *Timberman* 44 (2), 1942–43 (30–1).

The potential annual supply of *Tsuga heterophylla* bark in the States of Washington and Oregon is estimated at 11½ million cu. ft., which could yield about 70 million lb. of tannin extract. It is unfortunate that the majority of the Hemlock bark would have to be obtained from mills situated at salt-water harbours, as the salt contained in the bark of logs from these mills decreases the value of the tannin extract. It is stated, however, that the solution of the salt problem appears to be near at hand.

34.24 : 12.25 : 12.14.8. **Excellent cork from Fir bark.** *Timberman* 44 (2), 1942–43 (27).

Flaked cork that is highly suitable for certain uses can be supplied in large quantities (up to 50,000 tons a year) from the bark of Douglas Fir. When impregnated with resin this cork makes an extremely light and serviceable building board.

34.24 : 12.26–8 : 12.19 (75) : 21.3 : 21.11 : 65.7. HOPP, H., and POSEY, G. B. **Evaluation of Cork Oak as a new farm tree crop in the southeastern United States.** *Abstr.* in *Bull. ecol. Soc. Amer.* 23, 1942 (73). [Soil Conservation Service.] I.F.B.

An exploratory survey revealed that *Quercus suber* in the Southeast grows to maturity and produces a normal type of cork in the coastal states from southeastern Virginia to Louisiana. Trees averaged 6 in. diameter, a minimum size for stripping, in 13 years, and ultimately reached over 3 ft. diameter and 50 ft. in height. Virgin cork was as much as 3 in. thick on the largest trees, and typical secondary cork was present where the virgin cork had been stripped.

Possible plant growth regions (Mulford's classification) for Cork Oak culture are the Upper Coastal Plain and the Piedmont Plateau south of North Carolina. Cork Oak appears adapted to a wide variety of soils, but not to a shallow water table or dense overhead shade. Trees receiving fertilizer and cultivation or mowing grew 27 per cent. above average, and when mulched, 67 per cent. above average. Stem diameter was related closely to crown diameter (correlation coefficient + ·67); hence in growing Cork Oak, space for full crown development is essential.

34.24 (79.4) : 12.26–8. METCALF, W. **California seeks million Cork Oak trees.** *W. Cst. Lumberm.* 69 (11), 1942 (56). [University of California.]

It has been shown that the Cork Oak (*Quercus suber*) will grow under Californian conditions and that cork of excellent quality can be produced there. A yield of about 3 lb. of cork per year may be expected from each tree, the first stripping being made when the tree is about 8 in. in diameter, at 15–18 years. The record yield thus far is 851 lb. of cork from a tree about 90 years old and 50 in. in diameter. In order to produce 15,000 tons of cork per year to meet Pacific Coast requirements (10 per cent. of national requirements) it is proposed to plant a million Cork Oak trees in California. The task of growing and distributing these trees has been undertaken jointly by the State Division of Forestry, the University of California and the Crown Cork and Seal Company.

34.25. Christmas Trees. Medicinal Plants

34.25 : 12.25 : 60.31.2. DONEHOWER, W., and SACCO, D. J. **Christmas tree farming.** *Soil Conserv.* 8, 1942 (134, 136, 142).

Young Scots Pine are grown for Christmas trees on a 900-acre farm near Catawissa in Columbia County, Pennsylvania. The trees are pruned in order to ensure compact foliage, and are usually harvested 6 to 8 years after planting. It is claimed that each man can plant by hand up to 1,500 trees per day if the soil is prepared previously with a sub-soiler set at a 6-in. depth and dragged along the approximate contour by tractor.

34.25 (67.6–3). GREENWAY, P. J. **A use for saponins and some possible local sources.** *E. Afric. agric. J.* 8, 1942 (84–6). [East African Agricultural Research Sta., Amani.]

Possible East African sources of commercial saponin for fire extinguishers include the following trees and shrubs: *Sapindus saponaria*, *Balanites aegyptiaca*, *Barringtonia racemosa*, *Entada phaseoloides*, *Phytolacca dodecandra*, *Randia nilotica*, *R. taylori*, *Securidaca longipedunculata* and *Ternstroemia polypetala*.

34.25 : 12.26–8 (71.1) : 23.24. **Propagation of the Cascara tree: a conservation measure.** *Bull. B.C. Dep. Agric.* No. 108, 1941. pp. 9 + plates.

A booklet prepared mainly for use in schools, giving information on the appearance and growth of *Rhamnus purshiana*, together with notes on its propagation and conservation and the harvesting and utilization of the crop.

34.25 : 12.26–8 (71.1). DAVIDSON, J. **The Cascara tree in British Columbia.** *Bull. B.C. Dep. Agric.* No. A108, (revised ed.) 1942. pp. 32 + map. [University of British Columbia.]

The distribution and distinguishing characters of *Rhamnus purshiana* DC. are outlined, special attention being given to the present resources of Cascara in British Columbia. The usual method of obtaining Cascara by stripping the bark from standing trees is condemned as wasteful in that only one-sixth of the drug-content of the tree is thereby utilized, the inaccessible bark and the wood itself being left to rot. On the other hand, if trees are cut down to within 1 ft. of the ground, leaving a stump from which fresh shoots can sprout, the collector is able to obtain more bark from each tree and also to make use of the wood, which when finely ground may give an extract of 75 per cent.

efficiency. The Cascara supply would then be more constant as trees can be cut at any season, whereas the stripping of bark is confined to such times as the bark is easily separated from the wood. Trees would be sold at so much per cord to a manufacturing druggist, preferably located at a central point in the neighbourhood. Notes are given on the collection and storage of Cascara tree seeds and on the prospects of private commercial planting.

34.26. Resin. Turpentine. Oils

34.26 : 12.25. **Production of naval stores.** *Misc. Publ. U.S. Dep. Agric.* No. 476, 1942. pp. 10.

Notes on the production and utilization of resin in the U.S.A.

34.26 (73) : 33.32 : 12.25. BRAY, M. W. **Recovery of fats, waxes, resins and turpentine from wood.** *Paper Tr. J.* 115 (10), 1942 (41–2). P.R.

A brief review of the possibilities of recovering these materials from the wood used in the pulp industry of the United States, particularly from species of Southern Pine.

34.26 : 12.26–8. PENFOLD, A. R., MORRISON, F. R., and SMITH-WHITE, S. **The occurrence of two physiological forms of *Leptospermum citratum* (Challinor, Cheel and Penfold) as determined by chemical analysis of the essential oils.** *Repr.* from *J. Proc. roy. Soc. N.S.W.* 76, 1942 (93–5). [Technological Museum, Sydney.]

34.26 : 12.26–8. PENFOLD, A. R., MORRISON, F. R., and SMITH-WHITE, S. **Studies on the cultivation of the Tung Oil tree, *Aleurites fordii*. Part II. Study of a heavy yield of fruit obtained on the north coast of New South Wales.** *Repr.* from *J. Proc. roy. Soc. N.S.W.* 75, 1942 (148–56). [Technological Museum, Sydney.]

34.6. *Utilization of Logging and Milling Waste*

34.6 : 33.06. **[The use of a mixture of waste wood and coal on locomotives.]** *Engineering* No. 154, 1942 (376). Fuel Res. Summ. 1942 (602). P.R.

The use of a mixture of waste wood and coal for steam raising on locomotives has been tried and been found a success by the London Midland and Scottish Railway. It is anticipated that 2,500 tons of coal a year will be saved by the use of the mixture which, it is stated, will bring a locomotive into steam in almost the same time as coal. Most of the waste wood, of which no other use can be made, comes from the railway's carriage and wagon works and consists of Oak, Beech, Larch and Elm.

34.6 : 33.06 : 07.7. KREISINGER, H. **Combustion of wood-waste fuels.** *Mech. Engng.* 61, 1939 (115–20).

The fundamental principles underlying the combustion process and the factors by which it is influenced are discussed.

34.6 : 33.06 : 07.7. WILLEY, E. C. **Rating and care of domestic sawdust burners.** *Bull. Ore. Engng. Exp. Sta.* No. 15, 1941. pp. 23.

Laboratory and practical tests are described and a standard method suggested for determining the output and efficiency of domestic sawdust burners.

34.6 : 33.17. CAHAL, R. R. **More intensive utilization of sawmill waste.** *Sth. Lumberm.* 165 (2077), 1942 (36, 38). [Southern Pine Inspection Bureau, New Orleans.]

Recommendations for the increased utilization of slabs and edgings in the manufacture of by-products. Data are given on tests in which slabs were worked to 1 × 6-in. log-cabin siding.

34.6 : 33.32 : 12.25 : 12.26–8. STRACHAN, J. **The use of wood-waste. 2. Report on the use of wood-waste in papermaking.**—With discussion. *Proc. Papermkrs.' Ass. G.B.I.* 22, 1941 (111–26). L.S.

Pulp obtained from shavings and chips (not $> \frac{1}{8}$ in. thick) of various softwoods and hardwoods boiled by the soda process in esparto digesters was found to be of fairly high value. Wood-waste pulp used in combination with straw pulp ($\frac{2}{3} : \frac{1}{3}$) gives quite satisfactory printing and writing papers according to present standards.

34.6 : 33.38.2. **Sawdust motor fuel.** *Timb. Tr. J.* 164, 1943 (114).

A sawdust-burning producer-gas plant, constructed by B.V.P. (Distributors), Ltd., is described. The plant is mounted on a two-wheeled trailer and weighs about 8 cwt. It is suitable for vehicles of up to 4½-litre engine capacity. The distance that can be travelled on one fill is 75 to 125 miles. The fuel consists of sawdust or of a mixture of sawdust and small pieces of wood. It is not necessary for the sawdust to be treated, dried, or sieved in any way. Although sawdust from green wood is quite satisfactory, the best results are obtained with seasoned sawdust. The filter requires repacking every 350 to 500 miles, the filtering medium consisting of specially prepared sawdust. Among the principal advantages claimed for this producer are great flexibility and ease of handling. The producer can be lighted with a glowing cigarette end, the starting time being about one minute. If the vehicle is started on petrol, the change-over to gas can be effected after a run of about 150 yds. The price of the plant is £165, and the fitting costs £7 10s.

38. FOREST CONSTRUCTIONAL WORKS. ENGINEERING

38.2–3. GABER, E. Sparsamer Holzbau. **[Economical construction in wood.]** *Holz* 5, 1942 (312–20). [G.g.] [Techn. Hochschule, Karlsruhe.] P.R.

Note on designs of softwood structures recently employed in house and bridge building and miscellaneous construction in Karlsruhe.

38.2 : 31.27 : 12.26–8. LIMAYE, V. D. **Timber roof trusses with solid wooden disc dowels, and report on tests on two trusses of 40 ft. span.** *Indian For.* 68, 1942 (467–71 : plate). [Forest Research Institute, Dehra Dun.]

Comparison is made of the cost of materials and manufacture for a roof truss of 40-ft. span (1) made completely of steel (Rs. 375), (2) made of timber with steel accessories (Rs. 200), and (3) made completely of timber with solid wooden disc dowels and a few bolts (Rs. 100). The function of disc dowels in distributing shearing stress at the joints is discussed briefly. In a test of two 40-ft. trusses made of Sal, one constructed with steel gusset plates and straps (military design) and the second with solid wood (*Dalbergia sissoo*) disc dowels 3 and 4 in. in diameter and 1 in. thick, the latter proved superior as it supported a total load of 7 tons whereas the former broke at a load of 3½ tons.

38.2 : 33.15. EILERSTEN, L. W. **New method of laminating beams.** *Sth. Lumberm.* 165 (2081), 1942 (316).

In the method described the laminations are placed

side by side, the width of the planks being vertical and so representing the depth of the beam; thus glue lines are parallel to direction of load on the beam. Tests showed beams of this construction to be 4 to 15 per cent. stronger than comparable solid beams.

38.2 : 33.15. FEJÉR, G. **Wood after the war.** *Wood* 8, 1943 (22–25).

New developments in the use of wood in building are discussed. It is thought that after the war solid wood will lose some ground in Britain in certain fields of application in the building trade, but that this may be more than offset by increased use of modern wood products such as laminated materials.

38.2 : 33.15. KAHN, H. S. **Laminated arches.** *Wood* 8, 1943 (30–2).

A note on innovations in the U.S.A. in the construction of the 'Gothic' roof for farm buildings using glued laminated rafters.

38.2 : 33.4 : 33.15. STERN, E. G. **A study of lumber and plywood joints with metal split-ring connectors.** *Bull. Pa. Engng. Exp. Sta.* No. 53, 1940. pp. 59 + plates.

An account of tests on Teco split-rings of two designs (types A and E) used with Douglas Fir timber and plywood. The bulletin includes data on load-carrying capacities and joint deformations.

4. FOREST INJURIES AND PROTECTION

42. INJURIES FROM INORGANIC AGENCIES, EXCLUDING FIRE

42 : 43.3 : 23.27. LE SUEUR, A. D. C. **First-aid for bombed trees.** *Arborist's News* 7, 1942 (49–52). [*Repr.* from *Country Life*, Nov. 1941.] L.S.

Some methods of treating trees damaged by blast, splinters or fire.

42.2. *Temperature Influence*

42.21 : 07.7. STUDHALTER, R. A., and GLOCK, W. S. **Apparatus for the production of artificial frost injury in the branches of living trees.** *Science* 96, 1942 (165). [Texas Technological College, Lubbock.] L.S.

The range of temperature obtainable with this apparatus extends from 0 to – 45° C. for an interval up to 7 hours. [Cf. *For. Abstr.* 4 (53).]

42.21 : 12.26–8 : 34.26. FERNHOLZ, D. L., and POTTER, G. F. **Injury to Tung trees by low temperatures occurring in November, 1940.** *Proc. Amer. Soc. hort. Sci.* 40, 1942 (225–30). [U.S. Department of Agriculture, Bogalusa, La.] E.M.B.

42.21 : 42.32 : 11.11.2 : 21.12 : 21.64 : 12.11.1. LEVITT, J. **Frost killing and hardiness of plants.—A critical review.** Burgess Publishing Co., Minneapolis, Minn. 1941. pp. v + 211 + plates. [University of Minnesota.]

42.22 : 12.26–8. MIELKE, J. L., and KIMMEY, J. W. **Heat injury to the leaves of California Black Oak and some other broad-leaves.** *Plant Dis. Reptr.* 26, 1942 (116–9 + gph.) R.A.M. 21 (507).

Early in July, 1941, California Black Oak trees (*Quercus kelloggii*) growing over a wide area in northern California developed a reddish-brown discoloration of the leaves, confined mainly to a broad, irregularly shaped band round the margins. Many of the most severely affected leaves fell soon after injury became apparent. The condition is attributed to injury to the young leaves brought about by a sudden rise in temperature between 5th and 12th July, when the thermometer rose to 105° F.

42.3. *Precipitations*

42.32 : 12.25 : 22.89. MCKELLAR, A. D. **Ice damage to Slash Pine, Longleaf Pine, and Loblolly Pine plantations in the Piedmont section of Georgia.** *J. For.* 40, 1942 (794–7). [University of Georgia.]

An ice storm of 7th January, 1940, caused damage to Longleaf, Slash and Loblolly Pine (*Pinus palustris*, *P. caribaea* and *P. taeda*) plantations near Athens, Georgia, by breaking stems and limbs, bending stems, and uprooting trees. In certain important respects the damage was significantly greater in Longleaf and Slash Pine than in Loblolly Pine, probably due to the denser and more persistent foliage of the first two species. Many of the trees that were badly bent in February had completely recovered by October and others were expected to make partial recovery. The final net loss resulting from broken stems, uprooted trees, and badly bent trees that failed to recover was 24 per cent. for Longleaf, 29 per cent. for Slash, and 4 per cent. for Loblolly Pine. The diameter of the stem at the point where breakage occurred under the conditions prevailing was approximately 2 in. for all species.

42.5. *Chemical Influences. Nutrient Deficiencies*

42.5 : 12.25. EDLIN, H. L. **A salt storm on the south coast.** *Quart. J. For.* 37, 1943 (24–6).

In the spring of 1942 damage to the foliage of forest trees along a considerable stretch of the south coast of Britain was occasioned by an abnormal precipitation of sea salt carried inland by strong winds. This became noticeable early in June, when leaves on the seaward side of exposed trees turned brown as though affected by frost. Unlike frost damage, however, the browned and damaged foliage was confined to one side of the trees and extended their full length. Affected leaves had a distinct saline taste. As the season advanced the damaged foliage was in most cases screened by new growth, so that the incidence of the storm became progressively less noticeable. Although the damage was not apparent until early June, it was probably caused by the continuous high winds off the sea in the last ten days of May, which deposited a film of salt or saline moisture from the atmosphere. In the absence of rain this was not washed from the leaf surfaces, and continuous sunshine then concentrated the solution to the point where it damaged the leaves. Trees still in bud escaped damage, and leaves with a hard epidermis suffered little damage. However, trees of those species whose leaves were just appearing, such as Spruce, Larch, Beech, Elm, Sycamore, and Birch, were at a vulnerable stage and suffered considerable damage in consequence.

42.5 : 12.25 (902). LUDBROOK, A. J. **Nine years' work on Pine forest disease.** *Aust. Timb. J.* 8, 1942 (910–11, 927).

A brief review of the work so far done in Australia in connexion with the needle fusion disease of Pine. [Cf. *For. Abstr.* 2 (284, 322).]

42.5 : 12.25 : 24.51 : 21.3. SOUTH AUSTRALIA. **Woods and Forests Department. Annual report for the year ended 30th June, 1941.** Govt. Printer, Adelaide. 1942. pp. 12.

From investigations of a disorder of Radiata Pine grown on the poorer localities in the south-east of South Australia, it appears that:—(*a*) severe pruning in early youth may prevent dead topping or dieback long enough to allow the production of one good butt log, though such pruning may stimulate the growth of epicormic branches and so reduce the quality of the timber; (*b*) the health and vigour of trees liable to suffer from dieback is definitely improved by spraying with a solution of zinc sulphate (pp. 8–9).

42.5 : 12.25 : 56 : 11.42.1. NĚMEC, A. Untersuchungen über Ernährungsstörungen bei wachstumsstockenden Fichtenbeständen. **[Investigations on nutritional disturbances in Spruce stands of stagnating growth.]** *Bodenk. PflErnähr.* 23, 1941 (363–84). [G.] [Institut für forstliche Biochemie und Pedalogie der forstlichen Forschungsanstalten in Prag-Dewitz.] H.S.B.

Report on investigations in stands of different ages in several localities in Czechoslovakia. Stagnation of growth may be due to different factors, but can usually be ascribed to an unfavourable chemical composition of the soil. In the stands investigated such stagnation was due chiefly to one of the following groups of causes:—(1) disturbances in calcium nutrition; (2) excessive absorption of aluminium and iron, and deficient nutrition in phosphoric acid; (3) excessive absorption of aluminium and disturbances in calcium nutrition.

42.51. THOMPSON, A. R. **Gas and compaction in soil diagnosis.** *Trees, Sta. Monica, Calif.* 5 (5), 1942 (6, 18). [National Park Service.]

A discussion on the symptoms and treatment of trees suffering injury from concentrations of illuminating gas in the soil and on the maintenance of proper soil conditions in public-use areas.

43. FOREST FIRES

43 : 07.1 (73). JEMISON, G. M. **The place of fire protection in forest education.** *J. For.* 40, 1942 (834–6). [Appalachian Forest Exp. Sta.]

In view of the importance of fire protection to forest management in the United States, it is suggested that more time should be devoted to this subject in undergraduate work at forestry schools, and that at least one or two schools should provide opportunity for the student to specialize in fire protection.

43 (79 5 : 79.7) : 07.2. MATTHEWS, D. N., and MORRIS W. G. **A forest fire research program based on an analysis of the fire problems of forest management in Washington and Oregon.** *Misc. Publ. Pacif. Nthwest. For. & Range Exp. Sta.* 1941. pp. 66.

43.0. *Predisposing Factors and Causes*

43.0 (75.5–7 : 75.9 : 76.2–5). DEMMON, E. L. **Periodicity of forest fires in the South.** *Sth. Lumberm.* 165 (2081), 1942 (220–2). [Southern Forest Exp. Sta.]

Most of the forest fires in the southern States occur during the winter months, between October and April.

43.1. *Protective Measures*

43.1 : 07.7. **New devices aid rapid communication in forests.** *J. For.* 40, 1942 (881–2).

The new devices include:—(1) a simplified radio antenna which has no insulation, requires no elaborate installation, can be pre-tuned before installation, can be made from simple materials, is equally effective on wood and metal buildings, and acts as a lightning rod; (2) an improved radio receiver for use on mobile fire-control equipment.

43.3. *Fire Damage*

43.3 : 52.3 : 12.25. CHAPMAN, H. H. **Effect of annual spring fires on stump taper of Loblolly Pine.** *J. For.* 40 1942 (962–3). [Yale University.]

From the data presented it appears that the 28-year-old Loblolly Pine (*Pinus taeda*) under observation were developing buttressed trunks as a protective reaction against periodical ground fires in the area.

43.3 : 56.02 : 12.25. **Effect of fire on Longleaf Pine.** *Sth. Lumberm.* 165 (2081), 1942 (203).

Measurement of increment cores from trees surviving fires and from comparable trees on unburnt areas showed that for those less than 6 in. d.b.h. radial growth during the first year after fire was 0–65 per cent., averaging 23 per cent., less than the growth without fire. Larger trees with higher crowns were somewhat less affected.

44. DAMAGE BY HARMFUL PLANTS. VIRUS DISEASES

44.0. *Climbers and Epiphytes*

44.0 : 12.26–8. LUTZ, H. J. **Injuries to trees caused by *Celastrus* and *Vitis*.** *Abstr.* in *Bull. ecol. Soc. Amer.* 23, 1942 (73). [Yale University.] I.F.B.

Injuries result when vines twine tightly around stems and branches of young trees, inhibiting, if not completely stopping, downward translocation of organic solutes. The situation is quite analogous to that which exists when a tree stem or branch is subjected to ringing, that is, when the tissues external to the xylem are completely removed.

44.3. *Fungi*

44.3 (71) : 05.3. CANADA. **Twenty-first annual report of the Canadian Plant Disease Survey 1941.** Division of Botany and Plant Pathology, Department of Agriculture, Ottawa. 1942. pp. 102.

Fungi reported as causing diseases on forest trees include:—*Abies—Dimerosporium abietis* on foliage of *A. grandis*; *Hypoderma robustum* on older needles of *A. grandis*; *Melampsorella caryophyllacearum* on *A. balsamea*; *Poria weirii* on roots of *A. grandis* and *A. amabilis*; *Uredinopsis macrosperma* on 1-year-old needles of *A. grandis*.

Acer—Rhytisma acerinum on leaves of *A. rubrum*; *Verticillium* sp. on *A. saccharum*.

Juniperus—Gymnosporangium spp. on *J. virginiana*; *G. clavipes* on *J. communis*.

Picea—Chrysomyxa ledicola on *P. mariana* and *P. canadensis*.

Pinus—Cronartium coleosporioides on seedlings of *P. contorta*; *C. ribicola* on *P. monticola* and *P. strobus*; *C.* spp. including *C. harknessii* on *P. contorta*; *Stereum sanguinolentum* on roots of *P. ponderosa*.

Populus—Linospora tetraspora on *P. tacamahaca*; *Marssonia castagnei* on *P. tremuloides*; *Melampsora medusae* on *P.* sp.; *M. occidentalis* on *P. trichocarpa*; *Sclerotinia bifrons* on *P.* sp.; *Septoria populicola* on *P. trichocarpa*.

Pseudotsuga taxifolia—*Fusarium* spp., *Pythium* sp., *Rhizoctonia solani*, *Mucor racemosus*, and *Gliocladium roseum* on seedlings; other diseases reported on this species include *Adelopus gaeumannii* on needles, *Arceuthobium douglasii*, *Armillaria mellea*, *Fomes annosus*, *Phomopsis lokoyae*, *Phytomonas pseudotsugae*, *Poria weirii* and *Rhabdocline pseudotsugae*.

Quercus—*Armillaria mellea* on *Q. garryana*; *Phomopsis quercina* on young trees; *Polyporus sulphureus* on old trees; *Taphrina caerulescens* on leaves of *Q. macrocarpa*.

Salix—*Fusicladium saliciperdum* and *Physalospora miyabeana* on *S.* spp.; *Cytospora* sp. on *S. sitchensis*; *Marssonia* sp. on *S. babylonica*; *Melampsora* spp., *M. bigelowii* and *Rhytisma salicinum* on *S.* spp.

Thuja—*Coryneum berkmanni* on *T. orientalis*; *Keithia thujina* and *Fomes annosus* on *T. plicata*.

Tsuga heterophylla—include *Arceuthobium campylopodum* f. *tsugensis*, *Fomes annosus* and *Poria weirii*.

Ulmus—*Gnomonia ulmea* on *U.* spp.; *Nectria cinnabarina* on *U. pumila*.

44.3 (71.4). POMERLEAU, R. Liste annotee des maladies parasitaires des arbres observées dans le Québec. **[Annotated list of parasitic diseases of trees observed in Quebec.]** Ministère des Terres et Forêts, Quebec. No. TF–650, 1942. pp. 39. [F.]

44.3 : 12.21 : 11.14.3. PIRONE, P. P. **Wet summer tree troubles.** *Trees, Sta. Monica, Calif.* 5 (5), 1942 (14).

Unusually damp, rainy weather in the northeastern States during the summer months of 1942 was responsible for an increase in several fungous diseases, particularly basal rot of hardwood trees (*Phytophthora cambivora*) and the shoe-string rot disease (*Armillaria mellea*). Such weather conditions also favoured the formation of aerial roots on large trees and the development of leaf diseases caused by parasitic fungi.

44.3 : 12.25 (79.4) : 12.21. **Root disease of Pine saplings.** *Amer. Nurseryman* 76 (9), 1942 (22–3).

Groups of young Jeffrey and Ponderosa Pines (*Pinus jeffreyi* and *P. ponderosa*) in a cut-over area in northern California have become affected by a fatal root disease caused by *Cunninghamella*, the species of which are mostly saprophytic and soil-inhabiting. The Pines have apparently become diseased through the contact of their roots with dead stumps or with the roots of diseased trees.

44.3 : 12.25 (76.1). BOGGESS, W. R., SWARTHOUT, P.A., and TOOLE, E. R. **Results of the survey on the little-leaf disease of Southern Pines in Alabama.** (A preliminary report.) *Mimeo. Ala. agric. Exp. Sta.* 1941. pp. 15.

Widespread attack was observed in the survey. From a comparison of the number of trees and the volume of wood affected by the disease, it appears that Shortleaf Pine is more susceptible to it than Loblolly Pine, Virginia Pine, or Longleaf Pine. The spread of the disease is favoured by fire and by site conditions that are unfavourable to Pine growth.

44.3 : 12.25. **Second progress report on the little-leaf disease of Southern Pines.** Bureau of Plant Industry, U.S.D.A. 1942. pp. 25.

Report on work during 1941 by the little-leaf research staff of the Division of Forest Pathology, U.S.D.A. Observations are reported on the distribution and development of the disease and the possible effects of site conditions. So far the problem of the nature of the little-leaf disease has not been solved.

44.3 : 12.25 (79.5 : 79.7) : 12.21. ENGLERTH, G. H. **Decay of Western Hemlock in western Oregon and Washington.** *Bull. Yale Univ. Sch. For.* No. 50, 1942. pp. 53 + plates. [Bureau of Plant Industry, U.S.D.A.]

Analysis of 801 Western Hemlock trees from 14 plots located in the commercial range of this species in Oregon and Washington, showed that *Fomes annosus* was responsible for 21·0 per cent. of the board-foot volume decayed, *F. pini* for 19·2 per cent., *F. applanatus* for 17·1 per cent., and *F. hartigii* for 10·1 per cent. Fungi causing smaller percentages of decay were *Ganoderma oregonense*, *Fomes pinicola*, *Echinodontium tinctorium*, *Poria colorea* sp. nov., *Armillaria mellea*, *Polyporus sulphureus*, *Fomes officinalis*, *Polyporus schweinitzii*, *Polystictus abietinus*, *Fomes subroseus* and *Poria subacida*, in that order. The greatest number of infections occurred through scars caused by falling trees, but infections entering through mistletoe knots accounted for the greatest amount of decay.

44.3 : 12.25. JOHNSON, L. P. V., and LINTON, G. M. **Experiments on chemical control of damping off in *Pinus resinosa* Ait.** *Canad. J. Res.* 20, Sec. C., 1942 (559–71).

The consistently best controls against damping-off of *Pinus resinosa* in greenhouse or nursery seedlings were Semesam solutions 1 : 100 or 1 : 150 applied as a soil treatment. Red copper oxide suspension of 1 : 250 to 1 : 500 was particularly effective in the greenhouse. Red copper oxide and zinc oxide dusts were successful as seed treatment in the greenhouse. Acidifying agents such as sulphuric acid and aluminium sulphate were less effective than fungicides as a group. Seedlings from 2-year-old seed were more susceptible to damping-off than those from 1-year-old seed

44.3 : 12.25 : 12.21. **Spread of White Pine blister rust during 1941.** *Plant Dis. Reptr.* 26, 1942 (76–80). R.A.M. 21 (507–8).

During 1941 *Cronartium ribicola* spread in a southerly direction on *Ribes* spp. from central Virginia and West Virginia into northern Tennessee and North Carolina, while large numbers of cankers were found for the first time on Sugar Pine (*P. lambertiana*) in northern California and southern Oregon in districts where *Ribes* spp. had been found infected in previous years. In the Appalachian region infection spread southwards on wild *Ribes* for about 134 miles. In California the disease spread southwards in the Coast Range for 200 miles and in the Sierra Nevada for 170 miles; tangible evidence was obtained that infection is beginning to establish itself over a wide area in the northern part of the State. The year appeared to have been exceptionally favourable for rust intensification in the Western White Pine (*P. monticola*) region of north-eastern Washington, northern Idaho, and north-western Montana, owing to exceptionally wet conditions. In the north-central States the disease was recorded on White Pine (*P. strobus*) in three more counties in each of Minnesota and Wisconsin, and in one more in Michigan.

44.3 : 12.25 : 12.21. JOY, E. L. **Recent developments in White-Pine blister rust control in the Northwest.** *Northw. Sci.* 16, 1942 (55–8). A.P.B.

A review of the development of measures to control the White Pine blister rust (*Cronartium ribicola*) in North America—particularly in the northwestern United States—since its introduction in 1906. Most rapid progress was made from 1933 to 1936 but since

1937 lack of available workers has limited the scope of the programme. Maintenance work is the principal activity at present and consists mainly in the extermination of *Ribes petiolare* and *R. inerme* by means of chemicals, bulldozing and hand grubbing.

44.3 : 12.25 : 12.21. MARTIN, J. F., and GRAVATT, G. F. **Treatment of White Pines infected with blister rust.** *Fmrs.' Bull. U.S. Dep. Agric.* No. 1885, 1942. pp. 28. [Bureau of Entomology and Plant Quarantine, U.S.D.A.]

This bulletin presents information concerning the blister rust disease and the symptoms by which it can be identified, and describes methods of treatment.

44.3 : 12.25 (74.7) : 12.21. MCINTYRE, H. L. **White Pine blister rust control policies in New York State.** *J. For.* 40, 1942 (782–5). [New York State Conservation Dept., Albany.]

A brief history of blister-rust control work in New York. As a result of field investigations the width of the protective borders used in controlling this disease has been reduced from 900 ft., formerly considered necessary, to 50 ft. in dense woodland or swamp areas where the *Ribes* are screened from the Pine, 200 ft. in more open woodland, and 200 to 300 ft. for the eradication of cultivated red currants around Pine stands. It is maintained, however, that *Ribes nigrum* bushes should be destroyed in a zone at least one mile wide around plantations.

44.3 : 12.25 : 12.21. UNITED STATES. **Report of the Chief of the Bureau of Entomology and Plant Quarantine, 1941.** Superintendent of Documents, Washington, D.C., 1942. pp. 120. I.I.E.

An effective herbicide for killing decapitated *Ribes* crowns, in control of White Pine blister rust (*Cronartium ribicola*), is prepared by thoroughly mixing 1 part by weight each of dry borax and common salt. The following formulas have been found to be effective in *Ribes* eradication in California:—(1) furfural, technical, 5 per cent. and Diesel oil 27°–29° B., 95 per cent. by volume; (2) sulphur dioxide extract from lubricating oils 20 per cent. and Diesel oil 27°–29° B., 80 per cent. by volume (p. 48).

44.3 : 12.25 : 12.21. SNELL, W. H. **The production of sporidia of *Cronartium ribicola* on cultivated red currants in relation to infection of White Pine.** *Amer. J. Bot.* 29, 1942 (506–13). [Conservation Dept., Albany, N.Y.] O.B.D.

Investigations have shown that cultivated red currants produce far fewer sporidia than either black currants or wild gooseberries, and that Pines growing in the vicinity of red currant bushes are rarely infected, even at short distances, by sporidia of *Cronartium ribicola* from these bushes, except under conditions unusually favourable for infection. It is therefore doubtful whether the 900-ft. eradication zone for garden red currants near Pine is justified. [Cf. *For. Abstr.* 3 (340).]

44.3 : 12.25 : 12.21 : 23.26. POMERLEAU, R. Deux maladies des conifères en pépinière. [**Two diseases of conifers in nurseries.**] *La Forêt Québecoise* 3 (9), 1941 (13–22). [F.]

From 1931 to 1936 losses from damping-off in the forest nursery at Berthierville, Quebec, ranged from 19·5 per cent. for White Spruce (*Picea glauca*) in 1932 to 97·5 per cent. for Red Pine (*Pinus resinosa*) in 1934. Greatest mortality was due to *Fusarium* spp. while damage was also caused by *Rhizoctonia solani* and *Pythium debaryanum*. Measures suggested for control include:—(1) Seed to be sown in soil containing little organic matter; (2) Pine seed to be covered by not more than ¼ in. and Spruce by not more than ⅛ in. of soil; (3) density of sowing not to be more than 150 to the running foot in drills, or 500 to the sq. ft. if broadcast; (4) when seed is spring sown zinc sulphate, aluminium sulphate, or hydrogen sulphate should be applied to the seedbed at the rate of ½, ¼ and ⅛ oz. per 1 pt. of water per sq. ft., respectively.

Much damage was also caused by the snow blight (*Phacidium infestans*), especially to Spruce and Fir (*Abies balsamea*) in nurseries and plantations. This fungus can be controlled by the application of sulphur sprays in autumn. [See also *Rev. trim. Canad.* 28 (110), 1942.

44.3 : 12.25 : 12.21. TEHON, L. R. **Diseases of trees. Control damping-off of Longleaf Pine.** *Amer. Nurseryman* 76 (10), 1942 (28–9).

The fungus chiefly responsible for damping-off of Longleaf Pine is a species of *Rhizoctonia*. Sheet erosion, cultivation and weeding methods which mound soil about the young plants tend to increase the trouble. The sowing of seeds in shallow trenches and covering to a depth of ¼ in. with old sawdust seems the most practical method of control. The application of Semesan was also effective, but on account of its injurious burning effect it must be applied either late in the afternoon or on cloudy days.

44.3 : 12.25 : 12.21. SMITH, C. O. **Crown gall on species of Taxaceae, Taxodiaceae, and Pinaceae, as determined by artificial inoculations.** *Phytopathology* 32, 1942 (1005–9). [University of California Citrus Experiment Station.]

Inoculations with *Phytomonas tumefaciens* (Smith and Townsend) Bergey *et al.* were made on different species of conifers. Galls developed on the following species: (Taxaceae) *Podocarpus elongata, Taxus baccata* var. *erecta, T. brevifolia, T. media, Torreya californica*; (Taxodiaceae) *Cunninghamia lanceolata, Sequoia gigantea, S. sempervirens, Sciadopitys verticillata*; (Pinaceae) *Abies cephalonica, A. concolor, A. firma*, and *A. holophylla*. *Author's summary.*

44.3 : 12.25 (79.3–4) : 12.21. WRIGHT, E. ***Cytospora abietis*, the cause of a canker of true Firs in California and Nevada.** *J. agric. Res.* 65, 1942 (143–53). [Bureau of Plant Industry, U.S.D.A.] O.R.E.

On the basis of microscopic examinations a fungus causing extensive canker disease on both White Fir (*Abies concolor*) and Red Fir (*A. magnifica*) has been tentatively identified as *Cytospora abietis*. No significant difference was observed in the virulence of the two strains of fungus, but White Fir generally seemed more susceptible to infection. It appears that *C. abietis* is normally endemic in the forests of Sierra Nevada, and is likely to assume epidemic proportions only when the trees are weakened by drought, fire, insects or other factors.

44.3 : 12.26–8 : 12.21. **Chestnut blight in California.** *Amer. Nurseryman* 76 (9), 1942 (23).

The disease, probably introduced from the east, has been present in two Californian orchards since 1934 and in a third since 1938, but indications are that it may eventually be eradicated. In some respects it differs from the disease in the east in that no evidence of the

perfect stage of the blight fungus has been found, and blight lesions are less often on trunk and limbs and more often on the ground line or below it. The spores seem to have been carried mainly in irrigation water, and do not appear to have been spread, as in the east, by air, birds and splashing rain.

44.3 : 12.26–8 : 12.21 : 13.2. CALLAN, E. McC. ***Cryptorrhynchus lapathi* L. in relation to the watermark disease of the Cricket-bat Willow.** *Repr.* from *Ann. appl. Biol.* 26, 1939 (135–7). [Imperial College of Tropical Agriculture, Trinidad, B.W.I.]

A brief outline of the life cycle of the Poplar and Willow borer or weevil, *Cryptorrhynchus lapathi* L., and of experiments to ascertain the possibility of the transmission by this weevil of the watermark disease (caused by *Bacterium salicis*) to the wood of *Salix alba* var. *caerulea* Smith. Weevils allowed to feed on diseased shoots, or having their probosces smeared either with bacterial exudate from a watermarked shoot or with a culture of *Bacterium salicis* caused no symptoms of the disease when transferred to the branches of healthy plants.

44.3 : 12.26–8 : 12.25 : 12.21. CANADA. **National Research Council of Canada: Review of activities for the year ended March, 1941.** Ottawa. 1941. pp. 126. *N.R.C.* No. 1021.

An organism which causes serious leaf rust of Poplar-breeding materials at the Petawawa Forest Experiment Station has been identified as *Melampsora medusae* Thum. This rust completes its life cycle on *Larix*.

Certain trees in a 32-year-old White Pine (*Pinus strobus*) plantation, at Pointe Platon, Quebec, appear to be resistant to the blister rust and are being kept under observation as a potential source of parental stock (p. 88).

44.3 : 12.26–8 : 12.21. HARACSI, L. A cseresek veszedelme : a kétalakú tupló (*Fomes obliquus* (Pers.) Fries.). **[The dimorphous (oblique) wood rot: an enemy of *Quercus cerris*.]** *Erdész. Kiséri.* 43 (1/2), 1941 (1–31 + figs.). [Hung.g.] Biol. Abs. 16 (23117).

Dark brown knobs on the bark of *Quercus cerris*, Birch, and other trees are not sterile or abnormal fruiting bodies of *Fomes nigricans*, but conidia-cushions of *F. obliquus*, which produces 2 forms of sporophores—tuberous and tubular. The (conidio-) chlamydospores of the knobs are asexual reproductive organs, and the basidiospores of the tubular fruiting bodies are sexual organs. Brown mycelium that covers the surface of decayed wood can also produce chlamydospores. *Polyporus* (*Poria*) *laevigatus* Fr., which occurs on Birch, is probably identical with *F. obliquus*. This fungus, because of its wide distribution and great power to destroy wood, is a serious threat to stands of *Q. cerris*.

44.3 : 12.26–8 : 12.21. MAY, C. **A note on slime-flux in American Elm.** *Arborist's News* 7, 1942 (52–3). [Bureau of Plant Industry, U.S.D.A.] L.S.

In experiments on Elms 8 to 20 in. in diameter it was found that on boring a hole several inches deep into the wood an abnormal flow of water exuded from the central portion of the tree while the transpiration stream continued to move upwards in the newly formed vessels on the surface of the wood. The abnormal flow was similar to slime flux and originated in wet-wood invaded by bacteria. While many organisms were isolated from slime flux taken from the outside of several trees, the same yellow bacterium was isolated from fluxing liquid from the interior of the bored holes.

44.3 : 12.26–8 : 12.21. WENT, J. C. Invuren van iepen, veroorzaakt door *Nectria cinnabarina* (Tode) Fr. **[Die-back of Elms caused by *N. cinnabarina* (Tode) Fr.]** *Tijdschr. PlZiekt.* 46 (6), 1940 (212–5). [Inst. Comm. Scholten, Baarn.] Biol. Abs. 16 (19080).

44.3 : 12.26–8 : 12.21. COOLEY, J. S. **Defoliation of American Holly cuttings by *Rhizoctonia*.** *Phytopathology* 32, 1942 (905–9). [U.S. Bureau Plant Industry Station, Beltsville, Md.]

Description of a disease caused by *Rhizoctonia solani* Kühn observed in 1936 on cuttings of *Ilex opaca* Ait. Applications of disinfectant were not successful in controlling the disease, but sanitary measures, including the renewal of the sand in the cutting bed and the disinfecting of the bench, prevented the spread of the fungus which does not readily sporulate but reproduces largely by means of mycelial strands. The infection probably came originally from contaminated greenhouse material.

44.3 : 12.26–8 : 12.21. TEHON, L. R. **Diseases of trees: Defoliation disease of Holly cuttings.** *Amer. Nurseryman* 76 (12), 1942 (24).

The disease, which affects cuttings of *Ilex opaca*, is caused by the soil fungus *Rhizoctonia solani*, and may have originated in contaminated greenhouse material. The symptoms of the disease are described. Application of fungicidal chemicals proved ineffective in controlling the outbreak, but sanitary measures including the cleaning out of old sand and the disinfection of the benches had the desired effect.

44.3 : 12.26–8 : 12.21. URQUIJO LANDALUZE, P. La enfermedad de la 'tinta' del Castaño y su tratamiento. **[The Chestnut ink disease and its treatment.]** *Agricultura, Madr.* 11 (118), 1942 (54–6 + figs.) R.A.M. 21 (475).

The life history of the fungus is briefly summarized, and an account is given of the author's successful method of combating the disease by treatment of the exposed roots with a copper carbonate or copper oxychloride solution, which since 1934 has been applied to some 2,500 trees. [Cf. *For. Abstr.* 4 (191).]

44.3 : 12.26–8 : 12.21 : 13.2. WEDDELL, D. J. **Damage to Catalpa due to recreational use.** *J. For.* 40, 1942 (807). [University of Georgia.]

The presence of cankers, caused by *Hypoxylon rubiginosum*, on all trees over 3 in. d.b.h. in a plantation of *Catalpa bignonioides* was found to be due to the local fishermen beating the trees with clubs to dislodge the Catalpa worm (*Ceratomia catalpae*) which they used for bait.

44.3 : 12.11.1. OSTERWALDER, A. Baumimpfungen? **[Tree inoculations?]** *Schweiz. Z. Obst- u. Weinb.* 51, 1942 (221–30) [G.] E.M.B.

Since, as far as is known, trees do not form antitoxins, there does not appear to be any prospect of successful tree inoculations against diseases.

44.3 : 91.1. PEARCE, J., and SPAULDING, P. **Plant pathology in relation to northwestern forest wildlife cover.** *J. Wildlife Mgmt.* 6 (3), 1942 (194–202 ; plate). [Maine Coop. Wildlife Res. Unit.] Biol. Abs. 16 (21659).

Planting of food and cover plants for wildlife must be done with due precaution against introduction of

new diseases to the locality. Wildlife plantings especially must be watched for the introduction of alternate host plants which may spread destructive rusts and fungi to existing food and cover plants and nearby crops. The significance of these relationships in the management of northeastern (U.S.) forest wildlife cover is discussed. A table of the more important food and cover plants of this region attacked by impairing plant diseases gives the plant, the causative agents of the principal diseases, type of damage sustained, alternate or other hosts, if known, and an arbitrary rating of 1–3 for the seriousness of the disease. The secondary value of plant pathogens to wildlife in supplying food and creating tree cavities adaptable for dens and nests is mentioned. Several practices for minimizing introduction of certain specified plant diseases are given, including the use of locally grown stock, planting seed *in situ*, use of disease-resistant species or varieties, favouring the less susceptible tree species in forest-stand improvement and use of mixed clonal vegetative varieties.

44.4. *Virus Diseases*

44.4 : 12.26–8. FAWCETT, G. L. Departamento de Botánica y Fitopatologia. *Ex* Memoria anual del año 1941. **[Department of Botany and Phytopathology. *Ex* Annual Report for the year 1941.]** *Rev. industr. agric. Tucumán* 32 (1–3), 1942 (41–5 + figs.) R.A.M. 21 (481).

Includes reference to a graft-transmissible virus disease, characterized by chlorosis and stunting of the foliage, to which *Eucalyptus propinqua* seedlings, and to a lesser extent those of *E. saligna*, *E. citriodora*, and *E. maculata* are susceptible. *E. punctata*, *E. tereticornis*, and *E. rudis* are resistant to the trouble, from which *E. dwyeri* appears to be quasi-immune.

44.4 : 12.26–8. SWINGLE, R. U. **Phloem necrosis, a virus disease of the American Elm.** *Circ. U.S. Dep. Agric.* No. 640, 1942. pp. 8. [Bureau of Plant Industry, U.S.D.A.]

Ulmus americana L. and its varieties, the Vase Elm and the Moline Elm, are very susceptible to phloem necrosis. Infection may take place 6 months to a year or more before the symptoms of the disease become apparent, and affected trees usually die within 12 or 18 months thereafter—sometimes in a much shorter period. So far no positive cases of recovery have been recorded, and no cure is yet available, spraying being quite ineffective. The most promising method of control is the breeding of disease-resistant varieties. The symptoms of the disease are described.

45. DAMAGE BY ANIMALS

45.1. *Mammals*

45.12 : 12.26–8 : 13.2 : 44.3 : 12.21 : 45.2. PACKARD, F. M. **Wildlife and Aspen in Rocky Mountain National Park, Colorado.** *Ecology* 23, 1942 (478–82). [University of Colorado.]

Severe damage has been caused to *Populus tremuloides* in the Rocky Mountain National Park by fungous diseases, especially dieback (*Cytospora chrysosperma*), healthy trees frequently being infected through wounds in the bark caused by animals. Elks in particular have seriously injured the bark of most of the Aspen growing in their winter range, while mule deer, by browsing the young shoots are preventing adequate reproduction, and beavers have destroyed stands adjacent to their colonies. Among bird pests are the red-naped sapsucker (*Sphyrapicus varius nuchalis* Baird) and Natalie's sapsucker (*Sphyrapicus thyroideus nataliae* (Malherbe)) which have seriously scarred many trees by drilling. Human activity and inanimate factors are also responsible for a restricted amount of damage.

45.12 : 13.2. REEKS, W. A. **Notes on the Canada porcupine in the Maritime Provinces.** *For. Chron.* 18, 1942 (182–7). [Entomological Laboratory, Fredericton, N.B.]

Feeding by the Canada porcupine on forest trees is extensive in parts of New Brunswick and Nova Scotia and damage is severe in localized areas where the stands are of particular value, as in plantations and experimental areas. The only method of large-scale control ever attempted in the Maritime Provinces has been the bounty system. Experience in the United States suggests that this method is generally expensive for the degree of control effected. Control methods probably serve best if applied intensively to small areas where the damage is most serious. A method of localized control by den poisoning is discussed. *From author's summary.*

45.12 : 42.21 : 23.13 : 21.64. OSTROM, C. E. **Frost and rabbits as well as deer destroy tree seedlings.** *Tech. Note Allegh. For. Exp. Sta.* No. 33, 1942. pp. 2.

In four timber stands in the Allegheny National Forest exclosures fenced against deer, and against both deer and rabbits, were established in 1934 together with corresponding unfenced controls. Tree seedlings and sprouts were counted in 1936 and in 1941, and results showed that in old-growth stands where tree seedlings were originally abundant, density increased irrespective of fencing. In 45-year-old second-growth areas, however, fencing against both deer and rabbits caused a marked increase in the number of seedlings, although fencing against deer alone resulted in an insignificant improvement in regeneration. Moreover, on the lower slope the undergrowth in the rabbit-proof area consisted largely of blackberry, hobblebush and tree seedlings, whereas outside the fence ferns were dominant. Frost also was an important factor influencing the growth of the seedlings.

45.3. *Insects*

45.3 : 12.25 : 13.2. **Bud worm in Manitoba.** *Pulp Paper Mag. Can.* 43, 1942 (829, 842).

The recent penetration of Spruce budworm (*Cacoecia fumiferana*) into southern Manitoba and the Great Lakes area has been marked by a characteristic browning of the trees due to the feeding of the small caterpillars upon new needles and terminal buds. Defoliation is usually most severe in the tops of the crowns, and particularly heavy damage has been recorded in certain areas in the Kenora district where 60 per cent. of the trees have been killed. The larvae of more than 30 species of insects are parasites of the larvae of the budworm, and the future of this pest in the new areas will depend largely on the activities of these parasites.

45.3 : 12.25 : 13.2. EATON, C. B. **Biology of the weevil *Cylindrocopturus eatoni* Buchanan, injurious to Ponderosa and Jeffrey Pine reproduction.** *J. econ. Ent.* 35, 1942 (20–25 + figs.) R.A.E. A30 (523).

The results are given of biological studies and control

tests on *Cylindrocopturus eatoni* Buchanan, which occurs in central and northeastern California, where it has recently been found to be injurious to plantations of *Pinus ponderosa* and *P. jeffreyi*, usually when 1–3 ft. high. A common timber stain, caused by *Hormiscium gelatinosum*, is usually associated with this weevil. Treating uninjured Ponderosa Pines with sprays containing acid lead arsenate, light oil, wetting agents and water (100 : 25 : 3 : 1,000) or synthetic cryolite, wetting agent and water (100 : 1 : 200) applied at the rate of 1 U.S. pint per 10 trees gave complete protection without damage to the trees in cage and field tests in 1939.

45.3 : 12.25 : 13.2. ENGEL, H. Über die Populationsbewegung des Kiefernspanners (*Bupalus piniarius* L.) in verschiedenen Bestandstypen. **[On fluctuations in the abundance of the Pine looper moth (*Bupalus piniarius* L.) in different types of stands.** *Z. angew. Ent.* 29, 1942 (116–63). [G.g.] I.I.E.

Detailed account of observations carried out in 1936–38 in northern Germany during an outbreak of *Bupalus piniarius* L. in (*a*) even-aged Pine stands, (*b*) uneven-aged Pine stands and (*c*) even-aged with an understorey of Oak. The outbreak followed much the same course in all three types, but the increase in population was greatest in the first and least in the third. The increase was limited predominantly by biotic factors, among which predacious bugs, spiders and beetles were the most important. Natural enemies were relatively more numerous, as compared with populations of the Geometrid, in the pure than in the mixed stands, but during the collapse of the outbreak the decrease in its numbers was greater in the latter than in the former. This was due to the fact that alternative hosts were available in the mixed stands but not in the pure ones. Natural enemies are normally not numerous in pure stands, so that the moth is able to increase rapidly and reach levels of population higher than in stands of other types. The increase in natural enemies follows slowly, but when they become sufficiently numerous they cause a more rapid reduction of an outbreak than occurs in mixed stands.

45.3 : 12.25 : 13.2. FREEMAN, T. N. **A new *Argyrotaenia* from Spruce (Lepidoptera, Tortricidae).** *Canad. Ent.* 74 (4), 1942 (57). R.A.E. A30 (586).

A description is given of the adults of *Eulia* (*Argyrotaenia*) *occultana*, sp.n., from Nova Scotia, Quebec, Ontario and Alberta. The larva is destructive to Spruce foliage.

45.3 : 12.25 : 13.2 : 23.27. GAMBRELL, F. L. **Dormant treatments for the control of certain insects on nursery plants.** *Bull. N.Y. St. agric. Exp. Sta.* No. 698, 1942. pp. 22–5. R.A.E. A30 (570–1).

The results are given of tests over a number of years with dormant sprays, notably mixtures containing dinitro compounds, against Coccids and Aphids on ornamental trees and shrubs. In general, dinitro compounds in oil injured the foliage of most conifers. Elgetol, a preparation containing sodium dinitro-orthocresylate and penetrants, at concentrations of ¼ and 1 U.S. gal. in 100 U.S. gal. spray injured the foliage of some conifers, but not that of *Pinus mugo* and *P. strobus*. Norway and White Spruce, Jeffrey, Scots, Red, Mugho and White Pine were not injured by a spray in which Elgetol was replaced by 1 U.S. gal. Stantol (a preparation containing the sodium salt without penetrants). In general, satisfactory control of *Chermes* (*Adelges*) *abietis* on Spruce was given by sprays containing dinitro-o-cresol or dinitro-o-cyclohexylphenol in lubricating oil (1·6 oz. in ¼ U.S. gal. per 100 U.S. gal.) or suspended in water (4 oz. in 100 U.S. gal.), Elgetol (¼ and 1 in 100) and Stantol (1 in 100), but all, except Stantol and the suspensions, injured the foliage of Norway Spruce and Colorado Blue Spruce. A spray of 0·25 per cent. nicotine sulphate and 1 per cent. potash fish-oil soap applied at the green-tip stage gave good control of *C. abietis*.

45.3 : 12.25 (74.9) : 13.2. HAMILTON, C. C. **The *Taxus* mealybug, *Pseudococcus cuspidatae* Rau.** *J. econ. Ent.* 35, 1942 (173–5 + fig.) R.A.E. A31 (7).

This insect has been a serious pest of *Taxus* in New Jersey for several years. It infests all species but is most abundant on those having dense foliage. Continued heavy infestations stunt the growth and result in the death of the foliage. The adult female is described and notes are given on the life history of the insect. Sprays of proprietary materials containing rotenone, rotenone and oil, or retenone, pyrethrum and oil gave approximately 90–95 per cent. mortality when applied thoroughly in June, 1940; a spray of Loro (a thiocyanate) with Grasseli Spreader and Sticker (2 : 1 : 1,600), and one of nicotine sulphate (1 : 400) with 0·4 per cent. soap gave 98 and more than 99·5 per cent. control, respectively. A miscible tar-distillate spray also gave satisfactory control without injuring the plant when applied in summer.

45.3 : 12.25 : 13.2. **Minutes of the 524th regular meeting of the Entomological Society of Washington.** *Proc. ent. Soc. Wash.* 44, 1942 (55). I.I.E.

L. A. Hetrick reported the rearing of an undescribed species of *Xyela* from galls on young shoots of Loblolly Pine (*Pinus taeda*). The shoots are numerous and usually die, producing an effect on the tree like that of the Pine shoot moth (*Ryacionia frustana*). Two parasites have been reared from the *Xyela* galls, *Eurytoma tylodermatis* and *Habrocytus thyridopterigis*, both of which also parasitize the larvae of *R. frustana*.

45.3 : 12.25 : 13.2. HETRICK, L. A. **Some observations of *Ips* bark beetle attack on Pine trees.** *J. econ. Ent.* 35, 1942 (181–3 + figs.). R.A.E. A31 (8–9).

From investigations of many small scattered groups of dying Pine trees in eastern Virginia it was found that the species commonly responsible for primary attack were *Ips calligraphus* on large, thick-barked Loblolly Pine (*Pinus taeda*), and *I. avulsus* on smaller, thin-barked Pines, especially *P. virginiana*. *I. grandicollis* and *I.* (*Orthotomicus*) *caelatus* were usually of secondary importance. Trees injured by lightning are usually very attractive to these beetles, but those damaged during cutting operations are not generally attacked unless injury is severe, as the tops of felled trees are more attractive. Pines injured by serious surface and crown fires do not appear to be generally attractive, but those in woods that have suffered ground fires, which may damage the roots without burning the trunks or crowns, are frequently killed. Many attacks on growing trees have been traced to some form of root injury. Pulpwood storage yards, sawmill sites and any freshly felled Pines provide reservoirs of infestation. The beetles reproduce in the fresh cambium tissues, and the life-cycle may last less than three weeks in summer, so that large numbers may develop and infest growing Pines round the storage yards and in localities where

sawmill operations have been suspended. The summer cutting of Pine pilings and pulpwood is less important as the attractive portions of the trees are rapidly removed from the woods.

45.3 : 12.25 : 12.26–8 : 13.2. KNOWLTON, G. F. **Studies of western aphids.** *Proc. Utah Acad. Sci.* 18, 1941 (65–8). [Utah Agric. Exp. Sta.] N.H.M.

Species of Aphids reported on forest trees include *Eulachnus rileyi* (Wms.) on *Pinus sylvestris*, *Schizolachnus pini-radiatae* (Dvd.) on *P. ponderosa*, *Cinara brevispinosa* (G.-P.) on *P. contorta*, *C. oregonensis* (Wilson) on *P. contorta*, *C. taxifoliae* (Swain) on *Pseudotsuga taxifolia*, *C. terminalis* (G.-P.) on *Pinus*, *Lachnus salignus* (Gm.) on *Salix regalis* and *S. ellegantissima*, *Stegophylla quercifoliae* (Gill.) on *Quercus gambelii* leaves, *Euceraphis betulae* (Koch) on *Betula fontinalis*, *E. flava* (Dav.) on *Alnus tinifolia*, *E. gilletti* (Dvd.) on *Betula fontinalis* leaves and *Alnus tennifolia*, *Myzocallis alhambra* (Dvd.) on *Quercus gambelii* leaves, *M. punctata* (Mon.) on *Q. gambelii* and *Q. alba*, *M. robinae* (Gill.) on *Robinia neomexicana* and *R. pseudoacacia*, *M. ulmifolii* (Mon.) on *Ulmus americana* leaves, *Drepanosiphum braggii* Gill. on *Acer negundo* leaves, *Chaitophorus nigrae* (Oest. on *Salix fluviatilis*, *C. viminalis* Mon. on *Salix*, *Aphis maculatae* Oest. on *Populus*.

45.3 : 12.25 : 13.2. KRATOCHVÍL, J., and FARSKÝ, O. Das Absterben der diesjährigen terminalen Lärchentriebe. [**The dying-off of the current year's terminal Larch shoots.**] *Z. angew. Ent.* 29, 1942 (177–218). [G.g.] I.I.E.

It is shown that a malformation of the shoots of Larch, observed for some years in Bohemia and Moravia, is due to a toxin injected in the process of feeding on the needles by a thrips, described from all stages as *Taeniothrips laricivorus*, sp.n., with a light colour form, *pallidicornis*, n. The injury is confined mainly to the current year's shoots, chiefly in the summit of the crown, and affects the colour and shape of the needles, which later fall, distorts the shoots, causes an exudation of resin on which fungi develop, and, if severe, kills the terminal buds.

45.3 : 12.25 : 56 : 13.2. MARCUS, B. A. Über das Wachstum der Kiefer nach starken Eulenfrass. [**On the growth of Pine after serious injury by the Pine Noctuid.**] *Z. angew. Ent.* 29, 1942 (31–84). [G.] [Institut für angewandte Zoologie, München.] R.A.E. A30 (615).

An examination in 1938 of Pines in Bavaria that had been severely defoliated by *Panolis flammea* Schiff, in 1928–30 showed that trees that had been completely stripped were healthy and covered with needles. There was no notable difference in this respect between Pines on moorland soil and those on sandy soil, but Pines in dense stands still showed the effects of defoliation after seven years. Pines standing quite free resumed normal growth most quickly, especially as regards volume increment, though this did not compensate for the loss due to defoliation. As a rule, this loss corresponded to a growth period of 5–7 years; in trees 134 years old it represented one of 2–2½ years.

45.3 : 12.25 : 13.2. MCKENZIE, H. L. **A new species of *Matsucoccus* attacking Piñon Pine in California (Homoptera; Coccoidea; Margarodidae).** *Microentomology* 6 (1), 1941 (2–5 + figs.). R.A.E. A30 (533).

The author describes the adult female and larval stages of both sexes of *Matsucoccus monophyllae*, sp.n., which attacks growing twigs of Piñon Pine (*P. monophylla*) in California, often occurring under the bracts or bark scales or in the angle between the twig and the needles. The killing of branches has been observed on trees heavily infested with this Coccid.

45.3 : 12.25 : 13.2. MCKENZIE, H. L. **New species of Pine-infesting Margarodidae from California and southwestern United States (Homoptera; Coccoidea; Margarodidae).** *Microentomology* 7 (1), 1942 (1–18 + figs.). [Stanford University, California.] R.A.E. A30 (517).

Descriptions are given of two new genera and five new species, for which a new tribe, Pityococcini, is erected, found on Pines in the United States in association with species of *Matsucoccus*, which they closely resembled in appearance and habits. They comprise *Pityococcus ferrisi* on *Pinus monticola* and *P. lambertiana* in California, *P. edulis* in Arizona and *P. flexilis* in Utah and probably on *P. cembroides* in Texas; *Pityococcus deleoni* from *Pinus parryana* (*quadrifolia*) in California; *Pityococcus rugulosus* on *Pinus edulis* in Arizona; *Desmococcus captivus* on *P. monophylla* in California; and *D. sedentarius* on *P. monophylla* and *P. edulis* in Arizona. Keys are given to females of the new genera and to the females and (except in the case of *Pityococcus rugulosus*) to the larvae of the new species.

45.3 : 12.25 : 13.2. MCKENZIE, H. L. **Seasonal history of the Margarodid scale, *Matsucoccus bisetosus* Morrison, occurring on Ponderosa and Jeffrey Pines in California (Homoptera; Coccoidea; Margarodidae).** *Microentomology* 7 (1), 1942 (19–24 + figs.) [Stanford University, California.] R.A.E. A30 (517).

45.3 : 12.25 : 13.2. PEIRSON, H. B. **Control work on European Spruce sawfly in 1941.** [Maine Forest Service], Augusta, Maine. 1942. pp. 11.

In the greater part of the Spruce area of Maine the European Spruce sawfly population has recently decreased owing to disease, predaceous insects, animal predators and parasites. Some areas are, however, still heavily infested, and the insect remains a threat. The control programme includes the rearing and distribution of parasites such as *Microplectron fuscipennis*, *Microcryptus basizonius* and *Exenterus* spp. The two former were reared in 1941 with some success, but rearing of *Exenterus* had to be temporarily abandoned. Dissemination of wilt disease by spraying infested trees with a solution containing diseased larvae is also recommended.

45.3 : 12.25 : 13.2. SCHWARDT, H. H. **Control of native white grubs in young Hemlocks.** *J. econ. Ent.* 35, 1942 (176–7 + fig.). R.A.E. A31 (7–8).

The author summarizes the results obtained in a series of soil treatments applied during the summer of 1941 to young Hemlock (*Tsuga*) for the control of larvae of *Lachnosterna* (*Phyllophaga*), outbreaks of which have occurred in several parts of New York during the past few years, causing severe damage to young evergreens in nurseries and reforestation plantings. Injury to young Hemlock is characterized by a sudden and rapidly progressing yellowing of the leaves, which begin to drop about two weeks later when all the fibrous roots and the bark of the larger roots and crown nearly to the soil line have been consumed. As three or four second-year larvae, which feed for about four months, can probably kill a three-year-old tree in

ess than a month, a population of 1 per sq. ft. is otentially very destructive.

Each three-year-old tree was treated on 23rd June vith (*a*) 50 gm. of a mixture of lead arsenate and sand 1:20 or 1:40), applied by taking up the tree, shaking he soil from the roots and sprinkling the mixture over he roots and in the hole to which the tree was to be eturned; (*b*) 1 U.S. quart of a dilute emulsion ontaining 1 cc. dichloroethyl ether emulsified with Aresklene, alone or with 1 cc. methyl bromide, applied n a small depression round the tree and covered with lry soil; or (*c*) 5 gm. paradichlorobenzene crystals, pplied in a ring 10 in. in diameter and 2 in. deep round he base of the tree and covered. Counts of healthy rees made at intervals until 2nd October showed that ll treatments resulted in survival significantly higher han occurred in the control plots, but the only signiicant difference among the treatments was between lead rsenate and sand (1:40) and dichloroethyl ether; the ormer and paradichlorobenzene resulted in average ercentage survivals of 80 and 79, respectively, as ompared with 57 for dichloroethyl ether and 29 in the ontrol plots. The higher dosage of lead arsenate gave lightly lower survival (70 per cent.), possibly indicating a small decrease in resistance. Most of the trees that died did so between 11th July and 31st August, after which the rate of kill decreased in all plots, indicating hat the normal summer feeding period of the larvae nds at about this time. Both the lead arsenate treatments caused a slight yellowing of the tips of the leaves, but no retardation of growth was noticed, and dead trees in these plots were all killed by the insects. No injury was observed from any of the other treatments. If cost and ease of application as well as efficiency are considered, paradichlorobenzene is the best of the insecticides tested, and a slightly larger dosage applied earlier in the season would probably give better protection.

45.3 : 12.25 : 13.2. United States. **Report of the Chief of the Bureau of Entomology and Plant Quarantine, 1941.** Superintendent of Documents, Washington, D.C., 1942. pp. 120. I.I.E.

Data obtained in a hazard-inventory survey conducted in California show that about 11½ billion bd. ft. of Ponderosa and Jeffrey Pine (*Pinus ponderosa* and *P. jeffreyi*) have died from attacks by the western Pine beetle (*Dendroctonus brevicomis*) during the last 15 years and that much of the remaining stand is insect susceptible and likely to die unless factors affecting the vigour of the stand are more favourable (p. 26).

45.3 : 12.25 : 13.2. Will, H. C. **Sawfly infestations in Pennsylvania.** *Proc. Pa. Acad. Sci.* 16, 1942 (47–51 + figs.). R.A.E. A30 (575).

Includes reference to the occurrence in Pennsylvania of *Neodiprion lecontei* on Pine. The larva is described.

45.3 : 12.25 : 13.2. Yuill, J. S. **Preliminary studies on the control of the Lodgepole needle miner.** *J. econ. Ent.* 35, 1942 (16–20 + fig.) R.A.E. A30 (522).

In the Sierra Nevada of California, the larvae of *Recurvaria milleri*, Busck, destroy the needles of Lodgepole Pine (*Pinus contorta*), particularly in mature and overmature trees, and severe localized outbreaks usually result, directly or indirectly, in the death of 80–90 per cent. of the mature trees. The most favourable time to apply control measures is during the period in the late summer of the flight year when the eggs have been laid but the larvae have not yet entered the needles. Of a number of sprays applied to lightly infested trees about 18 days after the beginning of oviposition in 1937, one of 4 lb. lead arsenate, 1 U.S. pint nicotine sulphate, 2 U.S. quarts kerosene and ½ lb. commercial W.S.C. dynamite spreader, and another of 4 U.S. gal. light medium oil (92 per cent. unsulphonatable residue), 1 U.S. pint nicotine sulphate and 4 oz. blood albumin, both per 100 U.S. gal. spray, gave the best control.

45.3 : 12.26–8 : 13.2. Chatterjee, P. N. **Notes on some parasites of Shisham defoliators at Allahabad and Dehra Dun, India.** *Indian J. Ent.* 3, 1941 (157–70 + figs.). R.A.E. A30 (582).

Brief notes are given on the biology of parasites bred from the larvae and pupae of Lepidoptera that feed on the leaves of Shisham (*Dalbergia sissoo*) in the United Provinces and the Punjab, with descriptions of the immature stages of some of them.

45.3 : 12.26–8 : 13.2. Daviault, L. Description et biologie de deux lépidoptères nuisibles à l'orme. **[Description and biology of two Lepidoptera harmful to Elm.]** *Nat. canad.* 69 (6–7), 1942 (145–57 + figs.). R.A.E. A30 (516).

Heterocampa bilineata, Pack., and *Nerice bidentata*, Wlk., caused serious defoliation of Elm at Berthierville, Quebec, in 1937. About 11 per cent. of the larvae of *H. bilineata* were parasitised by *Comedo brevicapitatus*. All stages of the two Notodontids are described.

45.3 : 12.26–8 : 12.25 : 13.2 : 23.27. Felt, E. P., and Bromley, S. W. **The increasing importance of Coleopterous borers in shade trees.** *J. econ. Ent.* 35, 1942 (169–71). R.A.E. A31 (6).

Unfavourable weather conditions in the north-eastern United States in recent years have so weakened many shade trees as to make them particularly liable to attack by Coleopterous borers. Thus in 1940, large, apparently healthy, American Elms in New Hampshire were killed by *Hylastes* (*Hylurgopinus*) *rufipes*; in 1941, in south-western Connecticut, branches of Elms died following a heavy infestation by *Scolytus multistriatus*; during the same period, *Hylobius radicis* became an important pest of Scots, Austrian and Red Pines; and *Dendroctonus terebrans* and *D. valens* have caused unsightly damage to Pitch Pine (*Pinus rigida*). Other bark beetles that have increased considerably throughout the hurricane (September, 1938) area include *Ips pini* on White and Pitch Pine, *I. calligraphus* on White Pine, *I. grandicollis* on Red Pine, and *I.* (*Orthotomicus*) *caelatus* on Himalayan Pine (*P. excelsa*). In addition, the true cambium borers, such as *Agrilus bilineatus* on various Oaks and *A. anxius* on Birches, have increased locally and killed many trees.

45.3 : 12.26–8 : 13.2. Knowlton, G. F. **Predators of *Trioza maura*.** *J. econ. Ent.* 35, 1942 (15). R.A.E. A30 (522).

The predacious insects *Geocoris atricolor*, Montd., *Chrysopa oculata*, Say, and *Coccinella transversoguttata quinquenotata* Kby., were observed to feed on the Willow Psyllid, *Trioza maura*, Först., which occurred in large numbers on Willows in Weber County, Utah, in August, 1941.

45.3 : 12.26–8 : 13.2. Knowlton, G. F., and Thornley, H. F. ***Gracilaria negundella* Chambers, in Utah.** *J. econ. Ent.* 35, 1942 (110–1). R.A.E. A30 (532).

Whitening and curling of the leaves of Box Elder

(*Acer negundo*) trees, observed in Utah on 1st September, 1941, was found to be caused by *Gracillaria negundella*.

45.3 : 12.26–8 : 13.2. NASH, R. W. **Damage by the bronze Birch borer.** *Circ. Me. For. Serv.* No. 4, 1942. pp. [4].

The bronze Birch borer (*Agrilus anxius* Gory) was particularly active in Maine during 1940 and 1941, attacking both *Betula lutea* Michx. and *B. papyrifera* Marsh and killing or severely damaging many trees. Although normally the activity of the borer is of major importance only where stands have been opened up, the outbreak of 1940–41 included damage to closed stands and to younger trees which had previously been relatively free from attack. Data were obtained from a number of ¼-acre sample plots in stands of various ages, densities and types.

45.3 : 12.26–8 : 13.2. RAHMAN, K. A., and ABDUL WAHID KHAN. **A study of the life-history and control of *Batocera horsfieldi* Hope (Lamiidae: Coleoptera)—a borer pest of Walnut tree in the Punjab.** *Proc. Indian Acad. Sci.* Sec. B15 (4), 1942 (202–5 + plate). R.A.E. A30 (508–9).

All stages of the insect are described. Methods of control include killing the adults in June–October, destroying the eggs and the young larvae in their tunnels by probing with a knife or wire, and killing the older larvae by inserting into their tunnels potassium cyanide or cotton wool soaked in paraffin and sealing the holes with mud.

45.3 : 12.26–3 : 13.2. RAHMAN, K. A., and ABDUL WAHID KHAN. **Bionomics and control of *Aeolesthes holosericea* F. (Cerambycidae: Coleoptera).** *Proc. Indian Acad. Sci.* Sec. B15 (4), 1942 (181–5). R.A.E. A30 (508).

This paper comprises a review of the distribution of the Cerambycid *A. holosericea*, a list of the trees from which it has been recorded in India, descriptions of all stages, and an account of observations on its bionomics and control in the Punjab, where its host trees include Apple, Cherry, Apricot, Plum, Peach, Mulberry and Walnut.

45.3 : 12.26–8 : 13.2. SWEETMAN, H. L., and SMITH, M. E. ***Scymnus creperus* Muls., a predator on the woolly Elm aphid.** *J. econ. Ent.* 35, 1942 (103–4). R.A.E. A30 (529).

Large numbers of the Aphid, *Eriosoma americanum*, were destroyed by *Scymnus creperus* in the curled leaves of American Elm at Amherst, Mass., in late May and early June, 1941.

45.3 : 12.26–8 : 13.2 : 44.3. UNITED STATES. **Report of the Chief of the Bureau of Entomology and Plant Quarantine, 1941.** Superintendent of Documents, Washington, D.C., 1942. pp. 120. I.I.E.

Living trees injected with sodium chlorate and a small amount of sodium arsenite are effective as trap trees in the control of Elm bark beetles. Sodium chlorate attracts the insects to the tree and the lethal action of sodium arsenite prevents development of the new broods (p. 26).

45.3 : 12.26–8 : 13.2. WEISS-WICHERT. Massenauftreten der Ahorneule (*Acronycta aceris* L.). **[An outbreak of *Apatele aceris*.]** *Z. PflKrankh.* 52 (1), 1942 (40). R.A.E. A30 (539).

Apatele (*Acronicta*) *aceris*, is recorded as defoliating Norway Maple (*Acer platanoides*) and Horse Chestnut (*Aesculus hippocastanum*) in Danzig.

45.3 : 13.2 : 13.14. BEESON, C. F. C. **A guide to the control of termites for forest officers.** *Indian For. Rec. (n.s.) Entomology* 4, 1942 (44–90). [Forest Research Institute, Dehra Dun.]

The bulletin deals with the control of termites from all aspects of interest to forest officers, viz. termite attack on trees and termite damage to fencing, posts, poles, and forest buildings. In each case preventive and remedial measures are discussed fully and designs are provided for the main features of termite-proof buildings; in particular, attention is drawn to metal shields and other isolation devices at present unfamiliar to architects and engineers in India. Indian timbers generally reputed to be highly resistant to termites are listed, and methods of treating susceptible timbers with preservatives are discussed. The bulletin includes a detailed bibliography. *From author's summary.*

45.3 : 13.2 : 13.14 : 13.19. BEIRNE, B. P. **The biology and natural control of the Larch-shoot moth, *Argyresthia laevigatella*, H.-S.** *Econ. Proc. R. Dublin Soc.* 3, 1942 (130–49). O.R.S.

A general account is given of the systematics, synonymy, distribution, life history and biology of the insect. The degree of infestation seems to depend mainly on the amount of shelter afforded to the adult, and not on the health or situation of the tree.

In Ireland the most important factor in the natural control is insectivorous birds, which destroy an average of 67 per cent. of the larvae and pupae. A further 10 per cent. are destroyed by fungi, nematodes, hymenopterous parasites or other factors. The only species of hymenopterous parasite bred was *Ephialtes* (*Pimpla*) *elegans* Woldst., the larva of which is ecto-parasitic on the *Argyresthia* larva, an average of 1 per cent. being destroyed by it. *From author's summary.*

45.3 : 13.2. BREDENKAMP, J. Zur Kenntnis der Wirkungsweise der Kontaktgifte mit besonderer Berücksichtigung der Permeabilität der Insektencuticula. **[A contribution to the knowledge of the action of contact poisons with special reference to the permeability of the insect cuticle.]** *Z. angew. Ent.* 28 (4), 1942 (519–49 + figs.). R.A.E. A30 (512–3).

An account is given of laboratory investigations in Germany to ascertain how and under what conditions a contact insecticide placed on the integument of an insect penetrates the cuticle. When larvae of *Lymantria monacha* that had been kept for 18 days at various temperatures and humidities were dusted with pyrethrum, barbasco root (5 per cent. rotenone) and Detal (dinitro-ortho-cresol), the intervals that elapsed before symptoms of poisoning were observed were longest for the lowest temperatures and relative humidities, and shortest for the highest ones. From further experiments it is concluded that, while high relative humidities before and during dusting only slightly accelerated the action of the poisons, direct wetting of the cuticle distinctly hastened the action of Detal.

In experiments with cuticle from the dorsum of larvae of *L. monacha*, *L. dispar*, *Dendrolimus pini*, *Macrothylacia rubi*, *Trochilium apiforme* and *Bombyx mori*, chemical proof was obtained that Detal, nicotine, rotenone, arsenic trioxide, potassium arsenate and arsenic pentoxide pass through the cuticle without apparently going through any change in the process.

45.3 : 13.2. MCINTYRE, H. L. **The present threat of westward spread of the gipsy moth.** *J. econ. Ent.* 35, 1942 (171–3). R.A.E. A 31 (7).

A discussion of the success attained in preventing the estern spread of the gipsy moth (*Lymantria dispar*) in e United States by means of the barrier zone and the ntrol of small outbreaks in Pennsylvania and New ork. The importance of maintaining the barrier zone emphasized and the action necessary to do so is dicated.

.3 : 13.2. GERSDORF, E. Über eine Maikäfer-kämpfung in Bauernwäldern des Kreises Burgdorf-anover. **[On the control of May beetles in farm rests in the Burgdorf district of Hanover.** *Z. PflKrankh.* (11), 1940 (556–64). [G.] Biol. Abs. 16 (21222).

From investigations on the control of May beetles on ees and shrubs it was found that dusting the foliage th di-nitro-orthol-cresol compounds required less ne and fewer workers than did the collection of etles, but the costs were about the same for equal eights of beetles destroyed.

.3 : 13.2 : 13.15. KUSHEV, V. L. **On the infestation th cockchafer larvae of non-regenerated areas in the iddle Volga region.** *Lesnoe Khozyaystvo, Moscow* 40 (8), (23–7). [R.]

Report on a study covering an area of approximately 000 ha. in the Kuybishev region and comprising veral Scots Pine forest types. The cockchafer resumably *Melolontha hippocastani*) population was gher in fairly moist than in dry sites. The larval pulation was highest in plots with a medium shading the ground, such as in cut-over areas with oadleaved or Pine regeneration of medium density d in forest openings shaded by the crowns of old ees. The population was lower in soils with a direct d ample access of light, i.e. in open cut-over areas th a southern aspect. Very few larvae or none at all ere encountered where the soil was heavily shaded by nse regeneration or a dense canopy of old trees.

.3 : 13.2 (43.1–5). NEU, W. Der Maikäferflug an r Bergstrasse 1941. **[May beetle flight in the Berg-rasse region in 1941.]** *Z. PflKrankh.* 52, 1942 (249–61 figs.). [G.] R.A.E. A30 (576).

Details are given of the course of the flight of *Melolontha melolontha* and *M. hippocastani*, of the local stribution of the two species and of the average mber of eggs deposited.

.3 : 13.2 (43.1–5). REINMUTH, E. Zur Maikäfer-kämpfung. Mecklenburgische Erfahrungen und Beo-chtungen im Maikäferjahr 1938. **[May beetle con-ol. Experiences and observations in Mecklenburg in e flight year 1938.]** *Z. PflKrankh.* 52, 1942 (241–9). i.] R.A.E. A30 (575–6).

.3 : 13.2 : 13.15 : 11.44. SCHAERFFENBERG, B. Die ateridenlarven der Kiefernwaldstreu. [The Elaterid rvae of Pine forest litter.] *Z. angew. Ent.* 29, 1942 5–115). [G.g.] [Entomologisches Seminar der Uni-rsität Rostock.] R.A.E. A30 (615).

In view of the observation that many pupae of *palus piniarius*, L. in Pine forests in Germany are stroyed by Elaterid larvae, a study was made to termine the species responsible and their relative portance. For this purpose samples of the ground er from Pine stands in Mecklenburg were examined, d records are given of the species found and of ding experiments with them. The only species of portance in the destruction of the pupae were *lopius marginatus*, L., which was the commonest terid in both mixed and unmixed stands, *Alhous subfuscus*, Müll., which was the next commonest, and *Corymbites* (*Selatosomus*) *aeneus*, L. *Prosternon tessellatum*, L. (*holosericeum*, Ol.) was the only exclusively predacious species, but it was too rare to be of importance. The majority of the Elaterids were predominantly saprophagous, roots and insects being secondary foods. Though the pupae of *B. piniarius* were readily eaten, they formed an important item of diet only when abundant. Living roots were readily eaten only in dry weather and if humus was lacking. A key to the more common Elaterid larvae that occur in forests is appended.

45.3 : 13.2 (85). WEYRAUCH, W. La hormiga 'cogius'. **[Leaf-cutting ants.]** *Bol. Mus. Hist. nat.* '*Javier Prado*' 6 (21), 1942 (193–201 + figs.). R.A.E. A31 (23).

Leaf-cutting ants cause considerable injury to fruit and shade trees in the mountain regions of Peru. The most harmful were found to be *Atta cephalotes*, *A. sexdens* and an undescribed species.

45.3 : 13.2 : 13.11 : 11.11. WILKES, A. **The influence of selection on the preferendum of a Chalcid (*Microplectron fuscipennis* Zett.) and its significance in the biological control of an insect pest.** *Proc. roy. Soc.* (*B*) 130 (861), 1942 (400–15 + gphs.) R.A.E. A30 (605–7).

M. fuscipenne has been liberated against the Spruce sawfly (*Gilpinia hercyniae*) in widely separated areas in Canada but its establishment and increase have been considerably more successful in some areas than in others. When the climatic and ecological field data were studied in the light of preliminary laboratory tests, it appeared that these differences might be associated with definite preferences for certain temperatures on the part of the parasites. The temperature preferences of *M. fuscipenne* were therefore investigated and the apparatus and technique adopted in the tests are described.

45.3 : 22.14.2 : 12.25 : 13.2. UNITED STATES. **Report of the Chief of the Bureau of Entomology and Plant Quarantine, 1941.** Superintendent of Documents, Washington, D.C., 1942. pp. 120. I.I.E.

A practical test of sanitation-salvage logging as a means of controlling the western Pine beetle (*Dendroctonus brevicomis*) in mature Ponderosa Pine (*Pinus ponderosa*) was undertaken in a 1,000-acre tract in southern Oregon. Trees showing high risk of imminent beetle attack were marked for cutting and 18 per cent. of the stand was thus logged and salvaged. The treatment gave nearly complete beetle control the first year and was profitable to the timber company concerned (p. 25).

45.3 : 22.22 : 12.26–8 : 13.2. UNITED STATES. **Report of the Chief of the Bureau of Entomology and Plant Quarantine, 1941.** Superintendent of Documents, Washington, D.C., 1942. pp. 120. I.I.E.

Experience suggests that the use of coppice growth of Black Locust (*Robinia pseudoacacia*) as a means of reducing injury from the Locust borer (*Cyllene robiniae*) will be successful only on the better sites (pp. 27–8).

45.3 : 32.1 : 21.6 : 24.3. KEEN, F. P., and SALMAN, K. A. **Progress in Pine beetle control through tree selection.** *J. For.* 40, 1942 (854–8). [Bureau of Entomology and Plant Quarantine, U.S.D.A.]

Past studies on methods for controlling the western Pine beetle (*Dendroctonus brevicomis*) are reviewed. One of the first observations made in this connexion

was that the beetle tended to attack the more mature, slow-growing, decadent trees, avoiding the younger, thriftier, fast-growing individuals. Results from a number of studies showed that susceptible trees may be attractive to bark and cambium miners because of poor physiological condition as indicated by uniformly slow or reduced growth, lack of response to environmental stimuli, or production of certain sugars in the phloem. In order to have a basis for determining the relative susceptibility of trees to bark beetle attack, Keen [*J. For.* 34 (919–27)] set up a tree classification grouping Ponderosa Pines into 16 easily recognizable tree classes based on age and crown vigour. This was followed by efforts to define the characteristics of individual trees showing the highest current risk of loss from beetle attack [cf. *For. Abstr.* 4 (193)]. It is concluded that such risk ratings of individual trees are the best guide to sanitation cuttings for short-term beetle control purposes, whereas the classification of types of trees showing greatest average susceptibility to bark beetle attack is preferable as a guide to long-term protection.

45.3 : 44.3 : 34.26. BELYAEV, I. A. **Damage to Spruce as a result of resin tapping.** *Lesnoe Khozyaystvo, Moscow* 1940 (9), (28–36). [R.]

An account of recent investigations in the Leningrad region by the Central Scientific Institute of Forestry (TsNIILKh) on various methods of tapping Spruce, with special reference to damage by insects and fungi. It appears that tapping in mature stands for a period of two years using the Black Forest method does not seriously affect the quality of the timber, provided the following conditions are fulfilled:—(*a*) the stand should have a density of at least 0·8, since in more open stands the risk of damage by *Siricidae* is acute; (*b*) the width of the blazes should be 1·5 cm. and the distance between the blazes at least 15 cm.; (*c*) on completion of the tapping the timber should be extracted and seasoned without delay.

46. DAMAGE BY MAN

46 : 32.7 : 22.14.2 : 22.83. TRIMBLE, G. R. **Logging damage in partial cutting of Spruce-Fir stands.** *Tech. Note Ntheast. For. Exp. Sta.* No. 51, 1942. pp. 2.

Data were obtained on the character and extent of damage caused to the residual stand in harvesting under a partial cutting system. The one horse method of logging was employed and single tree hitches used exclusively. In order of decreasing frequency, damage was caused by skidding, felling and axe injury. Three types of stand were investigated:—(1) predominantly Fir, (2) predominantly Spruce, and (3) mixed Spruce/Fir/hardwood. Losses in residual growing stock were 3·9, 1·9 and 1·3 per cent., respectively, and additional damage in the form of injured trees promising early recovery was 13·7, 6·6 and 3·2 per cent., respectively. It appears from this study that (*a*) Fir is more easily injured than Spruce, (*b*) the amount of growing stock damaged increases with increase in the average diameter of the residual stand, (*c*) the larger the amount of residual growing stock the lower the percentage damaged.

5. MENSURATION. INCREMENT. YIELD

52. MEASUREMENT OF TREES AND TIMBER

52 : 01.7. SCHUMACHER, F. X., and CHAPMAN, R. A. **Sampling methods in forestry and range management.** *Bull. Duke Univ. Sch. For.* No. 7, 1942. pp. 213.

This bulletin is a sign of the increasing extent to which statistical methods for the collection and accurate mathematical analysis of data are taking their due and proper place in the business of forestry. The bulletin is concerned, as the title indicates, with the estimation of quantities by means of samples. Foresters have, of course, been doing this ever since forestry has been conducted for modern business purposes. The difference between the methods described by the authors and those commonly used in the past for estimating such quantities as volume of timber standing or area of land occupied by different forest types, is that the more modern methods, being based on the mathematical theory of probability permit of the determination of the error inevitably involved in the estimate of such quantities and also of the best estimate obtainable consistent with the time and money available for the work. Thus, so far as the estimate of these quantities is concerned, one is enabled to determine the probable degree of accuracy with which one is working.

The bulletin is divided into three parts. Part I gives the necessary background of statistical theory. This is done in an elementary but adequate manner and is necessarily more or less a repetition of what has been given previously in other works. Part II is concerned with direct estimates by sampling. The examples given are concerned with the sampling of an area in order to obtain a quantitative estimate of some characteristic, such as the area under grass or forest, or the volume of timber in different forest types within the area. These are methods eminently suited to forest survey work and should be of considerable interest to those concerned with it. Simple and stratified or representative random sampling is dealt with; also the sampling of regular and irregular areas and the problem of simultaneously sampling more than one population. Part III is concerned with indirect estimates through regression. The methods described here are concerned with those cases in which the quantity to be estimated, say volume of timber, is dependent mainly on two related characteristics, e.g. height of tree and sectional area of stem. If it can be shown that height, the characteristic most difficult and expensive to measure, varies in a consistent manner with the diameter of the stem at breast height, it is possible very largely to reduce the labour in sampling and at the same time to arrive at an adequately correct estimate.

The last chapter contains some very pertinent and useful remarks on some of the practical aspects of sampling and may be recommended to all concerned. The bulletin finishes with an Appendix in which the mathematical derivation is given of some of the quantities referred to in the text.

This is a book which may be strongly recommended to all foresters who are concerned with the making of statistical surveys, or estimating quantities by sampling, such as the number of plants available in nurseries. Those who have not already had an introduction to statistical methods should be warned that much of it is not easy reading. In fact it would usually be much the best if such readers went through the book under instruction in the first place. The

difficulties lie in the complexity of the problems and not in the mathematical nature of the methods demonstrated. The book is clearly written on the whole, but sentences do occur which might be clarified; e.g. on p. 19 'An accidental error, accordingly, may be regarded as an observed value, say y, as a deviation from the mean, μ, of the population from which it is drawn; hence symbolically $y - \mu$ is an accidental error'. Some slight further simplification might also be made by the relegation to the Appendix of certain demonstrations such as that on pp. 28 and 29 that $V(\bar{y}) \rightarrow \frac{1}{n}\sigma^2$.

The reading of such a book as this compels one to consider what will be the effect on the organization of Forest Services of the adoption of methods of statistical analysis such as are demonstrated by the authors. In the first place one may say that some, at least, will probably still need to be convinced of their value, at least in certain cases. The reason for this is that errors may enter into calculations which at present it may be difficult to estimate with any accuracy, and which probably completely over-weigh any error arising merely out of the basic estimate. Thus if it is desired to estimate volume of utilizable timber, allowance has to be made for losses by decay, by fire, by lack of accessibility, or by actual internal faults in the timber other than decay. The information in regard to these is sometimes scanty in the extreme. It would appear in fact that the methods here advocated increase in importance as management becomes increasingly intense and accordingly data regarding the forest become increasingly complete. Another aspect of the matter is the actual carrying out of the work. If these methods are adopted it would seem to be inevitable that a special statistical department must be developed, for in this Bulletin one is presented with a set of tools, and it is essential that these tools shall be used with knowledge and skill. This can be done properly only by adequately trained and experienced staff. It is thus desirable that the planning and supervision of the collection of data, as well as its subsequent analysis, should be in the hands of trained statisticians. It is extremely doubtful whether the average administrative forester will have time or qualifications adequately to plan the collection and afterwards carry out the analysis of data after the methods suggested. For, reasons such as these it is to be hoped that the statistical work in forestry, with certain aspects of which this book deals, will receive increasing and informed consideration by forest administration. W. R. DAY.

52 : 98 : 97.2. MATTOON, W. R., and BARROWS, W. B. **Measuring and marketing farm timber.** *Fmrs'. Bull. U.S. Dep. Agric.* No. 1210, (revised ed.) 1940. pp. 56.

52.4. *Measurement of Volume*

52.43. SIMMONS, F. C. **Simplifying tree measurement timber sale procedure.** *J. For.* 40, 1942 (963–6). [U.S. Forest Service.]

In the method described the d.b.h., merchantable height and usable contents (tenths merchantable) of each standing marked tree are estimated and applied to the average volume table (conifers or hardwoods) that has been developed for the region, and the net volume is tallied opposite the tree number. Volumes of trees to be left are tallied for information. An aid in determining usable content is a table which gives the percentage of total volume in each 4-ft. section of trees of various merchantable heights regardless of diameter. The advantages of the method are noted.

52.43.3 (74.8). MESAVAGE, C. **Volume tables for commercial timber in the anthracite region of Pennsylvania.** *Anthrac. Surv. Pap. Allegh. For. Exp. Sta.* No. 4, 1942. pp. 27 + map.

52.43.3 : 33.02 : 12.26–8. OSTROM, C. E. **Pulpwood volume table for Beech poles.** *Tech. Note Allegh. For. Exp. Sta.* No. 36, 1942. p. [1].

52.43.4. LEXEN, B. **Sale of stumpage on the basis of tree measurement.** *J. For.* 40, 1942 (845–53). [Rocky Mt. Forest and Range Exp. Sta.]

In order to overcome the disadvantages of timber scaling, total volume may be determined by measuring the standing trees. D.b.h. and height are determined for all trees to be cut, these measurements are applied to a suitable volume table, individual volumes are totalled and a predetermined sum is subtracted as a correction for defect and volume table bias. The advantages, disadvantages and limitations of this method are discussed, and as an improvement the author suggests the use of sampling in place of a complete tally of height and diameter measurements of all trees.

Two methods of applying sampling to the tree measurement method are discussed. The first assumes that the volume table is applicable or that it can be corrected with little difficulty. An error chart is provided for this method. The second method, which permits the accurate determination of error, assumes that the volume table data can be obtained from the cutting area. In this method a sample of 200 trees is needed for the determination of an expression of volume based on d.b.h. and total height, and a second sample of 1,000 trees for the determination of the height and d.b.h. of the average tree. Samples of the above sizes were large enough in the Lodgepole-Pine type to provide an estimate of total volume with a standard error of approximately 2·5 per cent. Further examination of this method indicated that if heights are neglected both in constructing the volume table and in determining the size of the average tree, no loss in accuracy of the estimate of total volume would result if the sample for determining size of average tree is increased to 2,000 trees. *In part from author's summary.*

56. INCREMENT

56 : 12.25 : 57 : 21.0 : 31.8. MARRIOTT, C. **Further notes on the growth of *Pinus insignis* in west Cornwall.** *Quart. J. For.* 37, 1943 (47–8).

Data from recently measured plantations indicate very fast growth, even in exposed situations near the sea where the wind is highly impregnated with salt. One plantation in such an exposed situation measured 5,759 cu. ft. under bark per acre at the age of 31 years.

56.01 : 12.25 : 65.7. SHIRLEY, H. L., and ZEHNGRAFF, P. **Height of Red Pine saplings as associated with density.** *Ecology* 23, 1942 (370).

Study of a stand 16 to 18 years of age in the Chippewa National Forest showed that in both compact and open plots height increased with density. Where the spacing was wide (approximately 20 × 20 ft.) the average height was 5·5 ft., and where it was as close as 5 × 5 ft. the average height was 14 ft. It is shown that 37 per cent. of the variation in height is due to spacing or factors associated with spacing. Trees of the same height in

1925 were shown to have grown more rapidly in the succeeding 10 years if they were located within 5 ft. of a neighbouring tree.

56.02 (79.8). GIDDINGS, J. L. **Dated sites on the Kobuk River, Alaska.** *Tree-ring Bull.* 9, 1942 (2–8).

A discussion of problems involved in the use of old tree-ring material within a forested zone in Alaska, with special reference to the dating of five sites of Eskimo villages.

56.02 (79.8) : 11.1. GIDDINGS, J. L. **Dendrochronology in northern Alaska.** *Univ. Ariz. Bull.* 12 (4), 1941. pp. 107 + dgms. [Laboratory of Tree-ring Research Bull. No. 1.]

Results of the examination of over 3,000 specimens, including buried wood from silt deposits, material from the University of Alaska archaeological collections, and specimens taken from living trees. Data from trees growing on the timberline or on the margins of large rivers were found to be more reliable than those obtained from other sites. In timberline species a strong correlation was found to exist between the tree-ring record and mean June temperature. Tree-ring dating promises to be of service also in other branches of science.

56.02 : 11.1. DOBBS, C. G. **A false-ring pattern in Larch.** *Nature, Lond.* 150, 1942 (377–9). [King's College, London.]

Examination of the annual rings on 105 butts of felled timber, chiefly 25- to 60-year-old European Larch, revealed a general and recognizable pattern formed by the false rings. The most frequent and conspicuous false rings were found to occur in 1918, about the centre of the year's growth. Others occurred in 1938, 1925, 1919, 1915, 1911, 1908, and in the years 1900 to 1905.

56.02 : 11.1 : 12.25. SCHULMAN, E. **Centuries-long tree indices of precipitation in the southwest.** *Repr.* from *Bull. Amer. met. Soc.* 23, 1942 (148–61, 204–17). [Laboratory of Tree-ring Research, University of Arizona, Tucson.]

Data derived largely from Douglas Fir (*Pseudotsuga taxifolia* Britt.) on representative sites in selected areas of Arizona, New Mexico and southwest Colorado.

56.02 : 11.15. MOSELEY, E. L. **Sun-spots and tree rings.** *J. R. astr. Soc. Can.* 35, 1941 (376–92). [University Museum, Bowling Green, Ohio.] L.S.

56.02 : 12.25 : 11.14 : 21.2. LYON, C. J. **Water supply and growth rates of conifers around Boston.** *Abstr.* in *Bull. ecol. Soc. Amer.* 23, 1942 (73). [Dartmouth College, Hanover, New Hampshire.] I.F.B.

Using large trees from the Boston area, trunk sections were taken from seven stands of White Pine and four lots of Eastern Hemlock trees. The widths of annual rings of wood were averaged for each year at each site and used as indices of growth rates. From the agreement among the four graphs of Hemlock growth increments, the years of maximum and minimum growth rates for the area were determined. A similar set of dates was read from the crests and troughs of the seven graphs for White Pine ring widths. Comparison of the relatively high or low growth rates in these years with the rainfall records from stations near the trees brought out the importance of rainfall during the growing season. There was also evidence of lag and cumulative effects from previous seasons and a general demonstration that fluctuations in growth rates reflect the variations in water supply.

56.03 : 24.36 : 12.25 : 22.14.2. PERSON, H. L. **Increment of residual Redwoods.** *J. For.* 40, 1942 (926–9). [California Forest and Range Exp. Sta.]

This study was undertaken to determine the probable increment (basal area) of residual Redwood trees in relation to diameter at time of release, and is based on the measurement of increment cores from selected trees on areas logged between 1900 and 1920. Only two of the factors considered showed a definite correlation with rate of growth. They were site quality and diameter at time of release. The average annual increment for all sites during the 20 years following release decreased from 32·85 per cent. for trees with an average d.i.b. of 3·3 in. to 0·66 per cent. for a tree 90 in. d.i.b. at time of release. For trees ranging from 9 to 36·7 in. d.i.b. at time of release, the average annual increment during 20 years after release varied from 2·2 to 8·7 times the average annual increment for the 20 years before release.

56.2 : 22.82.2. WAHLENBERG, W. G. **Methods of forecasting timber growth in irregular stands.** *Tech. Bull. U.S. Dep. Agric.* No. 796, 1941. pp. 55. [Southern Forest Experiment Station.]

A critical account of the various procedures of short-term forecasting of growth in irregular stands, with a detailed bibliography. Growth per cent. methods aiming at rough approximations, stand-table projection methods, and the 'méthode du contrôle' are discussed at some length, and comments are made on several fallacies commonly involved in forecasting growth. Evidence is advanced to indicate the futility of using too much detail in the computing procedures. For properties already under some form of management the recurring-inventory method is considered the most promising means of yield regulation.

56.2 : 22.82.2. CHAPMAN, H. H. **The problem of forecasting timber growth in irregular stands.** *J. For.* 40, 1942 (805–6). [Yale School of Forestry.]

Experience has shown that predictions of growth based on the straight-line projection of diameter growth may involve a considerable error, whereas the curvilinear method of forecasting diameter growth rate appears to have a high degree of accuracy. By this method the past growth in d.b.h. is separated into two or more five-year periods and plotted so as to detect and project, in the form of a curve for each d.b.h. class, any tendency towards either deceleration or acceleration of growth.

57. DEVELOPMENT AND STRUCTURE OF STANDS. YIELDS

57 : 12.25 : 22.82.1 : 24.25. LANGSAETER, A. **Produksjonundersøkelser i granskog.** [**Yield studies in Spruce forest.**] *Tidsskr. Skogbr.* 49, 1941 (333–40 + fig.). [Nor.] Biol. Abs. 16 (21009).

The yield of pure, even-aged stands of Spruce (*Picea abies*) up to 130 years old in southern and central Norway was studied. The stands were thinned every 3–5 years (medium grade of thinning) after the average diameter reached 5–7 cm., depending on site. The age of culmination of mean annual growth ranges from 70 years on the best sites to 130 years on the poorest, but the average diameter of the trees at the age of culmination is 26–29 cm., regardless of site. With slightly heavier thinning (taking 10 per cent. more volume at each operation) the mean annual growth culminates

0–8 years sooner. A third method of thinning was also studied which began as a medium thinning, followed with heavier thinning after about the 50th year on the best sites and the 90th year on the poorest.

57 : 12.25 (76.3) : 22.82.1. MEYER, W. H. **Yield of even-aged stands of Loblolly Pine in northern Louisiana.** *Bull. Yale Univ. Sch. For.* No. 51, 1942. pp. 39.

Local yield tables and other growth data based on plot records which were obtained over a number of years by the School of Forestry, Yale University. These records include several series of repeat measurements.

57 : 22.88.2 : 12.25 : 64 : 56.04. HORNIBROOK, E. M. **Yield of cutover stands of Engelmann Spruce.** *J. For.* 40, 1942 (778–81). [Rocky Mountain Forest & Range Exp. Sta.]

Yield data for Engelmann Spruce (*Picea engelmanni*) cut-over stands in Colorado were obtained using the multiple correlation and regression method of analysis. Site-index curves were prepared, and a satisfactory equation for estimating future yield was develo[illegible] is presented in alinement chart form together with table of mean annual gross increment for va[illegible] reserve volumes and time since cutting. Correction factors were prepared to adjust estimated yields for site index, stand composition and mortality. *From author's summary.*

6. MANAGEMENT. WORKING PLANS. SURVEYS

60. GENERAL LAND MANAGEMENT

60.3. *Management of Different Classes of Forest*

60.31.2 : 12.25 : 07.6 : 23.1 : 24 : 32 : 4. HAWLEY, R. C., and CLAPP, R. T. **Growing of White Pine on the Yale forest near Keene, New Hampshire.** *Bull. Yale Univ. Sch. For.* No. 48, 1942. pp. 44 + plates & map.

Description of the forest and its management, which is designed to serve as a demonstration of desirable forestry practice.

60.31.2 : 32.1 : 32.21 : 72 : 22.14.2 : 34.26. COULTER, C. H. **Cutting timber for increased profits.** *Bull. Fla. For. & Park Serv.* No. 13, 1941. pp. 17.

Suggestions for the guidance of Florida landowners in the management of their timber lands, with particular reference to timber marking and the supervision of timber cutting.

60.31.2 : 91.7–8 : 4 : 32.21 : 22.14.2 : 23.1. **Rules of forest practice.** American Pulpwood Association, Northeastern Region, New York. 1942. pp. 4.

The rules are concerned with:—(*a*) forest protection, (*b*) provision for young growth and restocking of cut-over areas, (*c*) cutting methods, and (*d*) the planned management of individual properties. Their purpose is to ensure that cut-over land is left in a favourable condition for future timber production .

60.31.2 (74.9) : 94.3 : 76. MOORE, E. B. **Practical forestry in New Jersey.** State of New Jersey, Department of Conservation and Development, Division of Forests and Parks. [1942.] pp. 31.

An account of the work of the New Jersey Department of Conservation and Development in helping land owners in the details of woods management [cf. *For. Abstr.* 4 (140).] The area under consideration is that of the hardwood forests of northern New Jersey and the lower Delaware valley.

64. DESCRIPTION OF SITE. ASSESSMENT OF SITE AND STAND QUALITY

64 : 12.19.2 : 61.3. ORDING, A. Botanikk og skogtaksasjon. [**Botany and forest surveys.**] *Tidsskr. Skogbr.* 49, 1941 (341–51). [Nor.] Biol. Abs. 16 (21016).

For classifying sites in Norwegian forest surveys, 7 vegetation types are indicated. Trial ocular surveys by a considerable number of individuals resulted in fairly close agreement on classification in the field.

64 : 23.21 : 12.25 : 11.62.1. DUNN, P. M. **Tree planting survey on some watershed areas.** *Abstr.* in *Proc. Utah Acad. Sci.* 17, 1940 (7). [Utah State Agric. College, Logan.] N.H.M.

A survey was made on six major watershed areas in the Cache National Forest. Data were collected on the vegetation, slope, exposure, moisture, and erosion conditions, and soil tests were made and drainage maps prepared. In general, planting conditions were not good owing to previous removal of vegetative cover, extreme exposures and soil deterioration. Trees recommended for planting include:—Engelmann Spruce above 7,800 ft., Lodgepole Pine above 7,500 ft., Douglas Fir above 6,500 ft., Ponderosa Pine below 7,000 ft., Blue Spruce below 6,500 ft.

64 : 61.32 : 12.19.2 : 97.1. LOSEE, S. T. B. **Air photographs and forest sites. I. Mapping methods illustrated on an area of the Petawawa Forest Experiment Station. II. Application of aerial site mapping methods to areas in Saskatchewan and Quebec.** *For. Chron.* 18, 1942 (129–44, 169–81). [Dominion Forest Service, Ottawa.]

In the work described, site quality is considered as the inherent growth producing capacity of the site rated for all crops rather than productive value in terms of one species. It is pointed out that within a region essentially uniform in climate and geology, differences in site quality are due largely to differences in soil and topographical situation, and that in the areas studied it was found that marked differences in soil could be correlated with differences in topographical situation. The factors chiefly responsible for this relation between site and topography (zonation of sites), under Canadian forest conditions, are (1) past glaciation and especially the effect of gacial melt water on soil fertility, and (2) the progressive change in drainage and related factors from areas in which the water table lies near the surface of the soil to the adjacent hill tops. Under these conditions site classification is based primarily on topography, supplemented for purposes of more exact valuation by the visible characteristics of the vegetation, including specific composition of forest stands and/or spacing of the individual trees. Both of these factors (topography and vegetation) can readily be studied from aerial photographs, which can thus be used for the classification of extensive areas after the preliminary work of correlating topographical and vegetational characteristics with individual sites has been completed. This method makes possible the rapid mapping of a forest area by absolute site qualities and can equally

well be applied to land that includes agricultural sites. The accuracy with which sites can be mapped in this way depends on ecological conditions and photographic information, together with the intensity of site classification desired and the amount of field work possible. The more complex the ecological conditions and the greater the intensity of classification desired, the more detailed must be the field and photographic data.

The data required and work to be undertaken in applying this method of site mapping are discussed and examples are given of the application of the method under four sets of ecological conditions on areas in different parts of Canada.

(i) Petawawa Forest Experiment Station, Ontario. Here a site classification had already been made, based on the work of Cajander. In aerial photos these sites were recognized by topographical features and tree cover, the latter being the most useful single means of distinguishing them. A total of 30 sq. miles was mapped. Over 16 sq. miles the photographic data were sufficient and a check showed an accuracy of 94 per cent. On the remaining 14 sq. miles tone distinctions were poor and a check showed an accuracy of 71 per cent. It is pointed out that the ecological conditions of this region are highly complex and that on areas less complex even photos of poor tone distinctions would be sufficient for accurate work.

(ii) The Pas Working Circle, Saskatchewan. Site divisions were determined largely by post-glacial geology. Six sites were described and mapped on an area of 900 sq. miles. In order of productivity from best to poorest these were fluvial, lacustrine, glacial slope, delta, plateau and lowland. Increment data obtained subsequent to the classification from plots on areas in the first three sites showed a correlation between diameter growth and the site divisions.

A short description is given of methods applicable to (iii) the Notakim Depot and (iv) the Lake Edward areas, both in Quebec, to show the adaptation of the general methods to these particular cases which are representative of large areas in Quebec and New Brunswick.

.64 : 97.1 : 60.31.2. McIntyre, A. C. **A new classification procedure for agricultural land according to use capabilities and its importance to forestry.** *J. For.* 40, 1942 (936–9). [Soil Conservation Service, Upper Darby, Pa.]

The proposed classification is to be based on standard practice and to be national in scope. Areas are to be mapped systematically, using a standardized colour for each use-capability class, and the maps together with simple instructions for guidance in their use are to be made available to farmers. At the same time cultural and management recommendations will be formulated for local application to each class of land.

In classifying land in this way, four groups of physical factors are considered. These include:—(1) permanence of the soil in relation to erosion and other factors, (2) soil productivity, (3) the presence of factors preventing the use of the land, (4) the climatic environment. Eight classes of land, according to use capabilities, are recognized, as follows:—

A. Suitable for cultivation with:—
   I. No special practices.
   II. Simple practices.
   III. Intensive practices.
   IV. Limited use for cultivation.

B. Not suitable for cultivation; suitable for permanent vegetation with:—
   V. No special restrictions or special practices.
   VI. Moderate restrictions.
   VII. Severe restrictions.

C. (VIII) Not suitable for cultivation, grazing, or forestry.

It is pointed out that maps showing the land so classified will be of value to foresters in four ways:—(1) to develop educational values and increase appreciation, (2) to facilitate overall planning for land use and conservation of resources, (3) to assist in planning for reforestation, and (4) to assist in planning for woodland management.

65. DESCRIPTION OF GROWING STOCK

65.7 : 22.88.2 : 12.25 : 56. Briegleb, P. A. **Progress in estimating trend of normality percentage in second-growth Douglas-Fir.** *J. For.* 40, 1942 (785–93). [Pacific Northwest Forest & Range Exp. Sta.]

From direct measurement on permanent sample plots it is shown that failure to allow for change in stocking when applying yield tables may result in considerable error in growth estimates. Furthermore, the trend in stocking is not always in the direction of the normal yield table standard. The rate and direction of this trend are found to be significantly related to stand age, distribution, and existing degree of stocking. A simple method for making indicated allowances when estimating growth of Douglas-Fir stands is illustrated.

7. FOREST ECONOMICS, VALUATION, AND FINANCE

74. VALUE OF THE STAND. VALUE OF THE FOREST

74.2 : 01.4. **The appraisal of market values of merchantable timber.** *W. Cst. Lumberm.* 69 (10), 1942 (26, 28–9). [General Land Office, U.S. Department of the Interior.]

Description of a chart devised to facilitate the computation of the stumpage value of Douglas Fir in Oregon and California.

74.2 : 52.1–3. Ostwald, H. Zur Frage der Ermittelung des Wertes stehender Waldbestände. **[On the question of estimating the value of forest stands.]** *Forstwiss. Cbl.* 64, 1942 (202–12). [G.]

Includes tables for Spruce at Gaildorf which allow of computing the sale value of a stand from the height, diameter, and form of the stems. The compilation of similar tables for entire regions is advocated.

8. ADMINISTRATION

82. LABOUR QUESTIONS

82 : 32 : 33.17. Kossoris, M. D., and McElroy, F. S. **Causes and prevention of accidents in logging and lumber mills.** *Sth. Lumberm.* 165 (2081), 1942 (295–6, 298, 300). [Bureau of Labor Statistics, Department of Labor.]

82 : 98.2 (73). **Accident rates in the lumber industry.—Highlights of 1941 experience, as reported by the National Safety Council.** *Sth. Lumberm.* 165 (2077), 1942 (51–2).

82 : 98.2 (79.5–7) : 33.32. RANDALL, R. **Labor relations in the pulp and paper industry of the Pacific Northwest.** [Northwest Regional Council, 511, Corbett Bldg., Portland, Oregon.] 1942. pp. 107. Dom. Comm. December 17th, 1942.

Presents an analysis and evaluation of the various factors which have contributed to the stability of labour relations in this industry. Following a discussion of the economic and institutional framework within which collective bargaining has developed, the actual methods of operation of the collective bargaining machinery and of the accomplishments of this employer-employee system are presented in detail.

9. FOREST POLICY

91. SOCIAL AND ECONOMIC SIGNIFICANCE OF THE FOREST

91 (42.1–8). **Forestry and the countryside.** *Quart. J. For.* 37, 1943 (35–8).

The need is stressed for harmonizing future forestry work in Britain with recreational and aesthetic requirements.

91 (71) : 02.1 : 3 : 4 : 12.19.2. La conservation de la forêt. **[Forest conservation.]** Dominion Forest Service, Ottawa. [1942?] pp. 83. [F.]

An account of forestry in Canada for the guidance of secondary school teachers preparing lessons on this subject.

91.1. *Rural Preservation. Reserves. National Parks. Plant and Animal Protection*

91.1 (72 : 72.8 : 729.1 : 729.3–4 : 8). COOLIDGE, H. J. **Notes on conservation in the Americas.** *Chron. bot.* 7, 1942 (155–63). [Museum of Comparative Zoology, Harvard University.] O.B.D.

A review of the present position in regard to the conservation and protection of flora and fauna in the countries of Central and South America and the larger islands of the West Indies.

91.4. *Value of the Forest in Hygiene and Recreation*

91.4. ELLISON, L. **Ecological aspects of forest recreation.** *Abstr.* in *Proc. Utah Acad. Sci.* 17, 1940 (9–10). [U.S. Forest Service.] N.H.M.

91.4 (67.6) : 23.3 : 12.26–8 : 11.6. HOPKINS, G. H. E. **Afforestation as a method of drying up swamps.** *E. Afr. med. J.* 17, 1940–41 (189–94). L.S.

Afforestation is claimed to be a cheaper and more effective anti-malarial measure than simple drainage under the conditions prevailing in Uganda, where the principal vectors of malaria are *Anopheles gambiae* and *A. funestus*. The aim of afforestation is to dry up the swamps more or less completely, leaving a minimum number of pools and ditches for permanent needs. These should be heavily shaded by Mango or some indigenous species of *Ficus* to render them unsuitable breeding places. *Eucalyptus robusta* is normally the most suitable species for general afforestation. The initial cost of afforestation is high, but the revenue later obtained from poles and fuelwood helps to compensate for this. The cutting of timber does not materially interfere with the efficacy of the measure, coppice growth being rapid.

91.3. *Influence of the Forest on the Environment*

91.3 (66.68) : 11.47.6 : 11.17 : 11.14.7. SCAËTTA, H. **Rôle de la forêt humide en Côte d'Ivoire dans la captation des poussières atmosphériques et la reconstitution des colloïdes argileux du sol. [Role of the wet forest of the Ivory Coast in the capture of atmospheric dust particles and the reconstitution of clay colloids in the soil.]** *C.R. Acad. Sci., Paris* 212, 1941 (273–6). [F.] L.S.

The fact that the rain forests of the Ivory Coast are able not only to subsist but to maintain their height and density is explained by the presence of a surface layer of organic soil that is being constantly reinforced by dust from the Sahara and Sudan, deposited by trade winds. The organic layer itself is very loose and friable, even when it attains the normal thickness of 10–13 cm., and trampling soon exposes the mineral subsoil. With the addition of the dust particles a colloidal layer is soon built up and cohesion is maintained at the surface by a turf of pioneer grasses. Destruction of the forest by felling, and still more by fire, diminishes the quantity of captured dust and leaves the surface soil open to erosion, and at best the original forest will be replaced by one inferior in both height and density.

91.8. *The Forest as a Source of Employment and Income*

91.8 : 94.1 : 94.4. WHITE, H. G. **Public forest homesteads.** *Pap. Mich. Acad. Sci. 1941* 27, 1942 (169–80). [U.S. Forest Service, St. Paul, Minnesota.] L.S.

A programme for improving the standard of living of timber workers and settlers in the northern Lake States, including arrangements for adequate housing conditions, sufficient tillable land for each settler on which to grow food for his family and his livestock, and the co-operative management and utilization of timber resources.

91.8 (481) : 98.2 : 33.32 : 33.17. STREYFFERT, T. Skogindustrierna och sysselsättningsmöjligheterna i Norrland. **[Forest industries and possibilities of the work in Norrland.]** In 'Industrien och Norrlands folkförsörjning'. Industriens Utredningsinstitut, Stockholm. 1941. pp. 28–45. [Sw.]

The object of the writer is in the first place to try to elucidate the trends of development and their consequences in regard to opportunities of employment and means of support which have resulted and which can be expected to result therefrom in the immediate future.

Rationalization and a continued transition from the sawmill industry to the pulp industry are the two main causes of the reduction in opportunities of employment in Norrland's timber manufacturing industry. A new spirit of enterprise is needed to take over not only the labour which will be released from forest industries for some time to come, but also the new labour originating from increase in population.

92. FOREST LAW

92 (71.6) : 96.3 : 32.21. CREIGHTON, G. W. I. **An act relating to the conservation of small trees.** *For. Chron.* 18, 1942 (188–90).

An act, which was passed by the Nova Scotia Legislature in March, 1942, prohibits the cutting, without authorization, of any Hemlock, Pine or Spruce tree less than 10 in. d.i.b. at 1–2 ft. from the ground, on holdings of 1,000 acres or more in area. Holdings in this category comprise more than 3 million of the 9 million acres of forested land in the Province. Balsam Fir is not included in the regulation as experience has shown that clear-cutting is the best method of harvesting this species. Present scarcity of technical staff makes it impossible to apply selective cutting of more advanced type than diameter-limit control, or to apply the present regulation to areas of less than 1,000 acres. The Act is set forth in full at the end of the article.

94. FOREST OWNERSHIP

94.4 : 60.31.2 : 98.3 : 97.1. PERCIVAL, W. C. **Co-operative woodland management and marketing—an essential part of a complete land-use program.** *J. For.* 40, 1942 (944–7). [West Virginia University, Morgantown.]

Experience indicates that a few basic principles must be observed if forestry co-operatives are to be successful. These principles are discussed briefly, with special reference to the situation in the areas served by the Otsego Forest Products Co-operative Association and the West Virginia Forest Products Association, and the essential activities of a typical co-operative are presented in some detail. The author concludes that co-operatives are needed to supply skilful and practical service to owners in the management of forest lands and the marketing of forest products, particularly in the supervision of the cutting and logging operations; and that they are consequently an essential part of a complete land-use programme.

94.4 (74) : 60.31.2 : 98.3. SOLIN, L. **A study of farm woodland cooperatives in the United States.** *Bull. N.Y. St. Coll. For.* 13 (2). [*Tech. Publ.* No. 48], 1940. pp. 118.

Includes a description of four co-operative associations of farmers situated in the northeastern United States. The four co-operatives were founded in 1935 or later and have received the aid of various public agencies in the form of free services and other subsidies in kind and in cash. The aim of the co-operatives is to improve the management of members' woodlands and to raise their income from forestry through collective marketing. One of the co-operatives has acquired a processing plant.

94.4 (75.6–9 : 76.1–4) : 98.1. MILLER, W. G. **Co-operating forest farmers boost southern forestry.** *Sth. Lumberm.* 165 (2081), 1942 (149–51). [Forest Farmers Association Cooperative, Valdosta, Ga.]

Note on the recently organized 'Forest Farmers Association Cooperative' of Valdosta, Ga., which operates in several southern States. The Association encourages members to practise better forestry and represents their legal and other interests.

94.4 (79.7) : 98.3 : 60.31.2. JAMES, M. C. **Washington Forest Products Co-operative.** *Northw. Sci.* 16, 1942 (76–8). A.P.B.

This conference paper discusses the organization, objectives and operation of a co-operative association formed in 1940 to assist farmers in the marketing of forest products and in the better management of their woodlands.

95. FOREST TAXATION

95.1 (73) : 94. HAYGOOD, T. F., and DAY, B. B. **Federal real estate and property tax rates.** Forest Service, U.S. Department of Agriculture, Washington, D.C. 1942. pp. 12 + tables.

The data presented indicate that the tax burden on rural property in states and counties with a high proportion of federally-owned land is not significantly higher than in those in which federal ownership is of minor importance.

96. POLICY REGARDING PROTECTION FOREST

96.3 (73). **Highlights in the history of forest conservation.** U.S.D.A. Forest Service. [1942?] pp. 14.

The most important dates in the history of forest conservation in the United States are given in chronological order, commencing in 1626 with an ordinance by the Plymouth Colony prohibiting the cutting of timber in colony lands without official consent. A list of national forests with the dates of their establishment is appended.

96 (73) : 97.1 : 93 : 94 : 98.1. MARSH, R. E., and GIBBONS, W. H. **Forest-resource conservation.** *U.S. Dep. Agric. 1940 Yearbook Separate* No. 1741, 1941. pp. 458–88. U.S. Govt. Printing Office, Washington, D.C.

97. POLICY REGARDING THE RELATION OF THE FOREST TO AGRICULTURE, PASTURE, AND INDUSTRY

97 (922) : 91.3 : 60 : 11.6 : 91.4 : 98.1 : 72. ZWART, W. **Het nut van de bosschen voor de gemeenschap. [The use of the forests for the community.]** *Tectona* 34, 1941 (866–82). [Du.]

The author discusses forest in general, whether Teak plantations or virgin forest, with special reference to Java. He notes in introduction that questions arise periodically which necessitate a fresh consideration of the actual value of the forest to the community. Examples of such questions are: (1) Is it, in view of the ever-increasing density of population, permissible or necessary to keep so large a part of Java under forest? This is considered to have been answered by van Doorn [cf. *For. Abstr.* 3 (356–7); 4 (000)]. (2) Must the Forest Service, since cultural technique is now so greatly improved, continue to take so firm a stand against the use of more or less steep lands for cultivation?

The value of the forest changes in accordance with place and period. In Java and at the present time the chief value of forest is in the author's opinion indirect, namely, the improvement of hydrological and orological conditions. Direct but secondary benefits are the production of wood and by-products, together with the provision of work for the community and advantage to the country's revenue. Passing reference is made to the military value of forest [cf. *Tectona* 32, 1939 (111–25)] and to the part forests may play in hindering malarial disease.

In discussing these points more fully, it is noted that the so-called climatological benefits of the forest have been purposely omitted because, although for some decades they have been regarded as of great importance, science has been unable as yet to produce any very convincing proofs. In this connexion it has nearly always been overlooked that it is not the influence of

the forest on its own climate that is of importance (for example, for the rejuvenation and maintenance of the forest) but the influence of the forest on the surrounding country.

A table is presented showing the estimated percentage of 'direct' to 'indirect' benefits from 1775 to 1940, the figures for 1940 being respectively 40 and 60 per cent.

The third section of the paper describes the many growing industries of Java and their requirements in different kinds of wood, nearly all of which the forests of Java should, in the long run, be able to supply. The final section is concerned with financial aspects and the provision of work. A plea is made that profits may not be the sole consideration governing policy. G.M.R.

97.1 (73). UNITED STATES. **National Resources Planning Board. Progress report 1940-41.** U.S. Govt. Printing Office, Washington, D.C. 1941. pp. 81.

97.1 (922) : 11.6 : 90. DOORN, Z. VAN. Grondverzorging en productieverhooging, een dubbele taak van het Boschwezen op Java en Madoera, toelichting op het prae-advies. **[Soil conservation and increased production, a double task confronting the forester in Java and Madura; light on an earlier report.]** *Tectona* 34, 1941 (824–8). [Du.]

Cf. *For. Abstr.* 3 (356–7). Some additional data and observations are presented.

97.1 : 60.31.2. AFANASIEV, M. **Short-time and long-time planning in forestry.** *J. For.* 40, 1942 (948–52). [Oklahoma Agricultural and Mechanical College, Stillwater.]

The indifference of many farmers in the southern United States to the proper management of their woodlands is due largely to lack of knowledge and understanding of the requirements and potential earning capacity of managed forests. As the time involved in raising forest crops is an important handicap to promoting private forestry, consideration should be given to the possibilities of obtaining early and recurring returns, either direct or indirect, from the property by means of short-time planning. This would involve such factors as (1) intermediate cuttings from natural stands or thinnings from plantations for the production of pulpwood, fence posts, fuelwood, etc., (2) the management of certain types of forest on short rotation, e.g. Catalpa for the production of fence posts, (3) the co-operative marketing of the products from such operations, (4) early benefits from forest plantations in the protection of soil, crops, etc. On the other hand, long-time planning is essential in the management of public forest property and of private forests owned and operated by large wood-using concerns, and in the restoration of waste land. In this connexion it is pointed out that there is reasonable certainty of a continuous market for forest products in the future and that high-quality timber will always be in greater demand and of higher value than low-quality timber.

97.2 (71.4) : 60.31.2. DELISLE, R. Les boisés de ferme. **[Farm woodlands.]** *La Forêt Québecoise* 5, 1943 (43–54). [F.]

The aggregate farm-forest area of Quebec is estimated at 12,000 sq. miles. It is suggested that there is considerable scope for the improvement of farm forestry in the Province.

97.2 (73) : 91.7–8. KIRKLAND, B. P. **The place of forests in the farm economy.** *U.S. Dep. Agric. 1940 Yearbook Separate* No. 1774, 1941. pp. 533–50. U.S. Govt. Printing Office, Washington, D.C.

97.2 (75.6–9 : 76.1–7) : 60.31.2 : 4 : 52 : 34.26 : 98.3. **Farm forestry in the South.** U.S.D.A. Forest Service, Atlanta, Georgia. 1941. pp. [108].

A popular guide to the management, protection, and utilization of farm woodlands and the marketing of farm-forest produce in the Southern United States. A special section deals with resin production.

97.2 (75.7). BRUNER, M. H. **What does the farmer want?** *J. For.* 40, 1942 (772–7). [South Carolina Extension Service.]

Analysis of replies to a questionnaire issued to farmers in South Carolina and dealing mainly with nine methods of approaching a farm forestry programme in that State. The methods included:—(1) education; (2) education correlated with personal forestry assistance; (3) forest leasing districts; (4) tax adjustment; (5) ownership by the state and federal governments; (6) forest credits; (7) benefit payments under the A.A.A.; (8) Government control; (9) fire protection.

97.3 (481) : 12.19.2. SANDBERG, G. Skogstyperna och markvalet for kulturbeten i Norrland. Iakttagelser och preliminära slutsatser under en studieresa i västerbottens lappmarker. **[Forest types and choice of ground for cultivated pastures in Norrland. Observations and preliminary conclusions during a study tour in the Lapp territory in West Bothnia.** *Svenska Vall- och Mosskulturföreningens Kvartalsskrift* 4 (2), 1942 (159–81). [Sw.] A.P.B.

A Norrland wooded slope shows as a rule a certain fairly regular distribution of forest types. The connexion between forest type and habitat type is dealt with, and the development of cultivated pastures in habitats characterized by different forest types is discussed. The types with a rich herbaceous ground flora form the best basis for cultivated pastures. They belong particularly to the calcareous districts and the coastal valleys and are also widely distributed in the mountains. Reference is made to Kolmodin's recently published account of experimental work with sodium chlorate. In his investigations the author has found that the forest types can advantageously be employed in the selection of the most suitable location for cultivated pastures.

98. THE TIMBER MARKET

98.1 (410) : 12.25 : 12.26–8. JAY, B. A. **Materials—the post-war outlook.—Timber.** *Architect, Lond.* 170, 1942 (171–2). P.O.

The author discusses the post-war timber supply problem, indicating possible sources of supply. It is concluded that softwoods should be available in some degree from Sweden and Russia, and also from North and South America, and that adequate supplies of hardwoods, many of which could well take the place of softwoods, will be available from West Africa, South America, United States and Canada. Timber consumers should make the attempt to use less familiar woods that, either through research or practical experience, have been proved satisfactory.

98.1–3 (485). MUNTHE, T. **Impressions from Sweden.** *Timb. Tr. J.* 164, 1943 (197–8).

Notes on the development of the Swedish timber industry since the outbreak of war. In spite of

increased home sales by export mills the reduction in their output between 1939 and 1942 has amounted to at least 250,000 standards. Fuelwood production has risen from the pre-war amount of about 7 million stacked cu. m. to 50 million cu. m. in 1942.

98.1 (485) : 33.02. HÖJER, E. W. Massaveden. **[Pulpwood.]** *Svensk PappTidn.* 45, 1942 (213–4). [Sw.] A.P.B.

During the crisis pulpwood has been used in Sweden to a considerable extent as fuel. The Fuel Commission estimates last year's consumption for this purpose at approximately 2 million cu. m. (stacked). Felling of pulpwood must be increased and at the same time consumption of such wood as fuel must be restricted to the smallest quantity possible. In regard to the production problems of the pulp industry, a genuine improvement in the situation in the country can be procured only by a rapid intensification of summer fellings.

98.1 (485) : 33.06 : 33.32. Cellulosafodret och bränslebristen. **[Cellulose fodder and the scarcity of fuel.]** *Svensk PappTidn.* 45, 1942 (237). [Sw.] A.P.B.

It is probable that the majority of Swedish farmers will during the winter 1942–3 have adequate amounts of supplementary feeding stuffs, and that the problem will then be to procure a concentrated fodder ration. In that connexion cellulose is not of great importance for cattle. The Minister of Agriculture's cellulose programme would require fully 4 million cu. m. of wood in stacked measure. As the provision of fuel threatens to be so difficult, it can hardly be advisable to utilize transport and labour for such a purpose.

A resolution has been submitted that the whole cellulose question should be re-examined. The supporters of the resolution consider it best that for the winter, cellulose should be excluded from the husbandry plan. [Cf. *For. Abstr.* 4 (266).]

98.1 (68.9) : 91.8. FINLAY, R. H. **Post-war employment and the timber industry.** *Proc. Rhod. sci. Ass.* 39, 1942 (88–96). R.S.L.

The author discusses the possibilities of establishing timber industries in Rhodesia that will make unnecessary at least part of the normal pre-war timber imports into that country.

98.1 (73). UPSON, A. **Lumber and the War Production Board.** *J. For.* 40, 1942 (909–13). [War Production Board, Washington, D.C.]

A brief discussion of the war-time lumber supply situation in the United States. For 1942, requirements are estimated at 38 billion bd. ft. and production at 32 billion ft. Factors causing lower production include the weather, labour scarcity, lack of equipment and supplies, rise in stumpage prices, difficulties in distribution and marketing. Steps are being taken to restrict lumber consumption by controlling its production, distribution and use as a raw material.

98.1 (922) : 71 : 76. SWART, F. Critische beschouwing van de doelstelling bij den Dienst van het Boschwezen inzake de houtvoorziening op Java en Madoera. **[Critical consideration of the objectives of the Forestry Service in relation to timber production in Java and Madura.]** *Tectona* 34, 1941 (829–39). [Du.]

The subject is discussed from the viewpoint of social economy. A comparison is made of (*a*) income of the population, (*b*) price of timber, and (*c*) use of timber in the Netherlands on the one hand and in Java and Madura on the other, whence it appears that the price of wood is approximately six times dearer for the poorer part (which is the greater part) of the population of Java and Madura than for the poorer inhabitants of the Netherlands. This applies to both building timber and firewood. A study of actual production shows that every year there is considerably greater quantity of wood available from thinnings made by the Forest Service than is sold to the community, while at the same time the poorer inhabitants of the country, mainly peasants, have to satisfy their very considerable requirements from Bamboo and fruit trees or other wood grown on their own land. The present economic policy of the Forest Service and its development is discussed, and it is suggested that greater effort should be made to reconcile a profitable working of the forests with rendering the purchase and transport of the Forest Service wood cheaper for the poorer part of the community. G. M. R.

98.2 (79.7). MELTON, W. R. **The lumber industry in Washington.** Belle Reeves, Secretary of State, Olympia, Washington. 1941. pp. 114.

An informative account of the organization and activities of the various branches of the American lumber industry with special reference to the State of Washington.

98.2 (79.7) : 43.1. **Exhaustive study and report on Washington's forest industries.** *W. Cst. Lumberm.* 69 (9), 1942 (60).

Note on the policy report of the special forest advisory committee appointed by the Governor of the State of Washington. The committee recommends the creation of a State Forest Board to direct and co-ordinate forest activities, including the protection of forests from fire, on which special emphasis is laid in the report.

98.2 (79.7) : 60.3. **Lumber industry mainstay of Washington.** *W. Cst. Lumberm.* 69 (10), 1942 (46, 48, 50).

Extracts from a report by a special committee appointed by the Governor of Washington to outline a forest policy for the State. The extracts contain a short account of the forestry practices prevailing in public and private forests and recommendations for improvements.

NOTES FROM THE DAILY AND THE NON-TECHNICAL PRESS

References: 1. *Christian Science Monitor*, Boston. 2. *Domestic Commerce*, Washington. 3. *Foreign Commerce Weekly*, Washington. 4. *M.A.N.*, Buenos Aires. 5. *Müncher Neueste Nachrichten*, Munich. 6. *Neue Zürcher Zeitung*, Zurich. 7. *Prensa*, Buenos Aires. 8. *Zora*, Sofia. The numbers in brackets indicate the reference number and the date of publication of the newspapers and journals to which the annotations refer.

Argentine. A recent issue of *M.A.N.* (4; July–August, 1942) contains notes on the pulp and paper, tannin, and plywood industries of Argentine. (*a*) The pulp and paper industry is stated to be gradually gaining in importance. In 1941 there were five plants in the country producing 32,389 tons of cellulose and wood pulp, including 22,242 tons of wheat-straw cellulose, 2,534 tons of Bamboo cellulose, and 7,613 tons of mechanical wood pulp, which was obtained from Poplar and Willow wood. (*b*) The tannin industry has reached such proportions that the country is now the world's chief producer. The raw material consists principally of Quebracho and Urunday from the Provinces of Santa Fé, Santiago del Estero, and Jujuy, and from the national territories of Chaco and Formosa. The Quebracho forests in the Salta and Cordoba Provinces are not being exploited at present. In 1940 the industry consumed 451,801 tons of Quebracho wood and 25,003 tons of Urunday and Guayacán woods. The branches and roots of the trees, as well as their stems, are being fully utilized, so that there is virtually no waste. (*c*) The manufacture of plywood was initiated a short time before the present war. Output is at the rate of 10,000 cu. m. per annum, which is less than domestic requirements, but production is increasing and plywood is already being exported to Uruguay, Peru, and Bolivia.

The *Prensa* (7) of 26.9.42 gives considerable publicity to a recent lecture by L. A. Tortorelli on the problem of Argentine's pulp supplies. Tortorelli states that in the past eleven years, annual consumption of newsprint has averaged 136,000 tons, all of which was imported. Recently the Forestry Institute of the Agricultural and Veterinary Faculty of Buenos Aires University has studied the problem of domestic pulp supplies with special reference to chemical pulp. It appears that the *Araucaria angustifolia* forests of the country are the most promising source of raw material for this purpose. Stands in the Misiones region are estimated to contain 4·2 million cu. m. of industrial timber, of which 2·5 million cu. m. are readily exploitable. This timber could supply sufficient raw material to satisfy domestic newsprint consumption for a number of years. In addition, an afforestation project should be initiated to ensure fresh supplies after the present stands are exhausted. *A. araucana* can be grown for pulpwood in Misiones on a rotation of 7–10 years, at the end of which the average diameter of the stand is approximately 25 cm. and the average yield 100 tons of industrial timber per ha. Tortorelli suggests that 2,000 ha. should be afforested annually for 10 years and that the 20,000 ha. plantation thus obtained should be managed on a sustained-yield basis and a 10-year rotation. The annual yield –200,000 tons of pulpwood—would cover all requirements for both chemical and mechanical pulp of an industry sufficiently developed to satisfy the internal demand for newsprint. There does not seem to be any reason why this should not be manufactured in Argentine at competitive prices. The growing of Spruce for pulpwood could also be developed. *Picea abies* and *P. alba* grow well in the Patagonian Andes; for instance, in the Tierra del Fuego the trees regenerate naturally and at the age of 14 years reach a height of 10 m. and a diameter of 18 cm. Finally, it is stressed that Argentine possesses a number of broadleaved trees which could be used in the manufacture of mechanical pulp.

Australia. According to recent reports the number of producer-gas-driven vehicles, including a few low-power railcars, has now reached 36,000 (3; 19.12.42).

Brazil. The use of portable producers is on the increase. In Rio de Janeiro six concerns, having a total monthly capacity of 630 units, are manufacturing apparatus for commercial use. The Government of the State of Sao Paulo has approved a project for turning out 10,000 units at the cost of 5½ contos each (exchange approximately 1 contos = £10), and factories have been established in the States of Santa Catharina, Parana, and Minas Gerais. The Light and Power Company of Rio de Janiero manufactures units for its own use and is reported to be operating 24 lorries and 16 buses on producer gas (3; 14.11.42).

Bulgaria. The manufacture of 'Mulberry wool' from the bark of Mulberry trees is being organized under the Food Export Directorate. It is claimed that 'Mulberry wool' is cheap to produce and gives a strong durable fabric when added to cotton, rayon, or poor-quality silk. It is estimated that an annual output of 1–2 million kg. would cover about one-third of the country's textile needs (8; 3.9.42, 10.9.42, and 13.9.42).

Denmark. More than 14,000 vehicles are said to be equipped with producers, and many sawmills have specialized in the provision of suitable fuels. Fear has been felt, however, that the supplies of charcoal and wood might be exhausted, and the authorities have therefore favoured the use of peat and peat-wood mixtures. The operating cost with peat is about twice as high as with wood (3; 19.12.42).

Finland. The existing shortage of labour has made itself particularly felt in forestry, with marked adverse effects. In the absence of accurate statistics, the following estimates are believed to represent current conditions with fair accuracy. It is estimated that only 40 per cent. of firewood requirements were cut during the 1941–42 felling season. Sawlogs felled amounted, it is believed, to about 30 per cent. of the annual average for the period 1935–9. Comparatively, the cut of pulpwood was even smaller. Timber sawn in 1941 is thought to have amounted to about 450,000 standards, as against 850,000 in 1939 and 1,200,000 in 1935. Timber exports, estimated at 220,000 standards for 1941, somewhat exceeded those of 1940, but this figure contrasts with an annual average in excess of 1,000,000 standards for the period 1935–8. A rise of 10–15 per cent. in export prices for

timber during 1941 was offset by increased costs of production. Plywood production fell from 220,000 cu. m. in 1939 to 90,000 cu. m. in 1941; exports fell in a similar ratio. The production of mechanical pulp in 1941 was 20,000 tons, as against 200,000 tons in 1939, while exports were 27,000 tons in 1941 as against 193,000 tons in 1939. Chemical pulp produced in 1941 amounted to 590,000 tons, an increase of 60,000 tons over the preceding year, while exports of this item rose from 260,000 tons in 1940 to 490,000 tons (perhaps one-half of normal volume) in 1941. The German demand for sulphite pulp for the manufacture of munitions may have been largely responsible for the volume of exports. Newsprint production, which amounted to 450,000 tons in 1939, decreased from some 80,000 tons in 1940 to about 50,000 tons in 1941, and exports fell to 50,000 tons. Production of other paper amounted in 1941 to 190,000 tons, with exports of 100,000 tons. Total 1941 paper exports are estimated to have amounted to about one-third of pre-war volume. The table of indexes compiled by 'Unitas' shows the following production situation, by volume, for 1941 (1935 = 100):- timber industry, 36; paper industry, 40; plywood industry, 49 (3; 10.10.42).

Germany. A drive is in progress to convert during the winter as many tractors and other agricultural machinery as possible to use with producers. The 'Land' Food Offices will state what types of tractors are to be converted. If a farmer does not arrange for the conversion of a tractor when he is instructed to do so, he will be given no more petrol. In deciding what tractors are to be converted, farmers who can supply their own wood or peat will be given preference. A bonus will be paid to farmers if the driver of the tractor has successfully taken a course in the handling of producer-gas-driven tractors (5; 17.12.42).

India. More than 6,000 motor vehicles in India have been converted to use with producer gas, and quotas of steel have been obtained for converting an additional 12,000. In Bombay owners are encouraged to convert their vehicles by being granted advances and by partial exemption from the motor tax. In return they agree to a quarterly inspection which enables the authorities to supervise the maintenance of both vehicles and producer-gas plants. Factories for the manufacture of producer-gas plants have been established at Rampur and Ghaziagad, and manufacture is also to be started at Lucknow, Fyzabad, Gorakhpur, and Allahabad (3; 14.11.42 and 21.11.42).

Italy. According to recent surveys made by the forestry authorities, the felling of trees in the State forests has been greatly intensified. Sawn timber and logs produced from Government forests in 1941 amounted to 1,035,855 cu. ft.; in addition 110,200 metric tons of charcoal and 77,140 tons of firewood were obtained. The forest administration now owns 671,840 acres of land, of which 400,140 acres are covered with forests (3; 12.12.42).

Norway. A number of Norwegian industries which formerly used cork as an insulating material are now employing peat for that purpose owing to the difficult cork situation brought about by the war (3; 10.10.42).

Rhodesia. With the demand for producer-gas plants growing owing to the lack of petrol, the Government of Southern Rhodesia has found it necessary to control the manufacture and sale of producers, the main reason being the shortage of the steel plating required.

The Southern Rhodesian Road Transport Department is experimenting with wooden tyres for slow-moving vehicles. The tyres are made with blocks fitted into wheel rims. Bearings are being tested for effects of the increased vibration (3; 31.10.42).

Sweden. [Cf. *For. Abstr.*, 4 (141).] A new agreement governing the export of 15,000 tons of kraft paper ('Spinnpapier') was concluded between Germany and the Swedish paper industry at the end of October, which will increase the total Swedish paper export to that country to 50,000 tons as against the originally agreed 35,000 tons. The total Swedish cellulose export will be below that of last year, particularly as regards sulphate cellulose for German paper manufacture, which will not exceed the 45,000 tons agreed on in the spring, while the export of artificial silk cellulose will amount to only 140,000 tons approximately. Owing to the reduced State purchases of fodder cellulose the export industry had hoped that an increase in the export of other cellulose would be possible. [*Note:* State fodder purchases had been reduced from 525,000 tons originally arranged for the period June, 1942–May, 1943 to 340,000 tons. Cf. *For. Abstr.* 4 (264).] However, the Swedish authorities do not appear inclined to issue additional export licences. The reason for this may be found in the serious raw material situation of the cellulose industry as well as in the difficulties which confront the foreign buyer when trying to obtain suitable compensation articles for import to Sweden. The cellulose industry is all the more seriously affected because export to Brazil had to cease as a result of that country's entry into the war. A further difficulty is the shortage of forest labour as well as shortage of wood for fuel and of electric power. In these circumstances eight cellulose factories and several sawmills have decided to close down, and it is assumed that most of the remaining cellulose factories will close down for about three months during the winter. A number of sawmills in the north have likewise decided to close down for a certain period as from the 1st November and others are likely to follow suit. All these measures will release labour for forestry work, while saving wood and power. Although the Government, after a great deal of hesitation, has decided to employ about 30,000 men of the 1923 military class for service in the forests in the spring of 1943, this will hardly be sufficient to complete the wood supply programme, and further increases in the call-up are expected. Of the 55 million cu. m. of wood to be cut during the period [year?] up to the 1st July, 1943, so far only 6·25 million cu. m. have been cut, representing a further increase in the deficit of the wood-cutting programme and giving rise to increasing concern in regard to the future development of the supply situation. No further increase in the sales of timber to Germany is possible in the circumstances, Swedish timber exports to that country for 1942 being estimated at 235,000 standards or about 610,000 tons, which compares with 250,000 standards during 1941 (6; 12.11.42).

Increased production of pre-fabricated wooden houses in Sweden is reflected by the output of the A.B. Svenska Trähus, which shows a 50-per-cent. rise in 1941 over 1940. This organization sells for a number of sawmills and joinery plants, which cut the timber and assemble the houses. Sweden's total 1940 production of this type of

house was 9,200 units. To promote the sale and to organize the export of pre-fabricated wooden houses, an export organization was established in 1941. Large quantities have since been exported to Germany, Norway and Finland (3; 10.10.42).

In order to encourage the production of tar from tree stumps and the distillation of by-products, the State Fuel Commission has granted permission to manufacturers of such tar to dispose of the distillates, some of which can be used as motor fuel. The Commission reports that six companies have established factories for treating tree stumps. The stumps are burned in retort kilns, and in the subsequent distillation process the following approximate yields are obtained:—Light fraction (fuel-oil distillate), 20 per cent.; heavier distillates (lubricating-oil distillates), 45 per cent.; pitch residue, 20 per cent. Losses amount to 15 per cent. About 20 per cent. of the stumps, by volume, remains in the form of charcoal. This contains sand which prevents its use as fuel in producers. It is used, however, by the iron and steel mills in the manufacture of charcoal pig-iron. Turpentine is the main constituent of the fuel-oil distillate to be marketed by the tar producers. By further refining, methanol, acetic acid, and formaldehyde are obtained, but in such small quantities that they can be profitably extracted only by large plants. Packed in drums, the tar is sent under Government control to an oil refinery where the lubricating oil is fractioned. Since it thickens when heated, the lubricating oil cannot be used in internal combustion engines, but it is used as machine oil (3; 19.12.42).

United States. Timber is now being extracted at the rate of 3 million bd. ft. per working day from the Tillamook Burn, an area of about 400 sq. miles in western Oregon that was devastated by a crown fire 9 years ago. The logging is carried out by the Consolidated Timber Company and other concerns, and it is estimated that 40 per cent. of the volume and 50 per cent. of the value of the original growing stock will be salvaged eventually, when the total volume and value of the salvaged timber will amount to 4,000 million bd. ft. and $80 million, respectively. The logging roads now being constructed will help in future fire protection (1; 16.12.42).

More than 600 logging operators in the State of Oregon are collaborating with a special scrap-metal salvage committee and the Western Pine Association in the reclamation of whatever metal—relics of past logging operations—may be found in the forests throughout the State. The operators will furnish lorries, tractors, and other equipment required. Members of labour unions have been asked to donate their services for the collection (2; 26.11.42).

Furniture manufacturers, who may no longer use metal springs, are experimenting with wooden springs for chairs, divans, mattresses, etc. The wooden 'Victory' spring, developed by the School of Design in Chicago, is built of veneer strips hinged at alternate ends and folded over wedges in zig-zag fashion, and can be made from any hardwood with a straight grain. As yet the cost of production is excessive (2; 24.12.42). [Cf. *For. Abstr.* 4 (242).]

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